U-TECH 2023

UNDERSTANDING TECHNOLOGY 2023

Author: Mr. Kris Ayre

UR-TECH INDUSTRIES

1ST Edition © June 2023

Table of Contents: U-TECH 2023

1. Copyright and Disclaimer.....6
2. Introduction.....6
3. The Basics.....9
   3.1. *Hardware*.....10
   3.2. *Software*.....10
   3.3. How Hardware and Software work together.....11
   3.4. Bits and Bytes.....12
   3.5. Storage, Memory and Optical Drives...12
      3.5.1. Hard disk drives and SSD's:.....14
4. Operating Systems.....14
   4.1. Filesystems.....17
   4.2. The Desktop.....17
   4.3. The First Desktop Operating Systems with folders.....17
      4.3.1. Files.....18
      4.3.2. Folders.....18
5. Smartphones.....18
   5.1. Manufacturers.....20
   5.2. Brands.....20
   5.3. Models.....21
   5.4. Features of modern smartphones.....21
      5.4.1. Apps (Applications – programs)..21
      5.4.2. Settings.....21
   5.5. Hardware.....25
      5.5.1. Buttons.....25
         1. Power On/Off.....25
         2. Volume Up and Down.....25
         3. Key Combinations.....25
      5.5.2. Touchscreens.....25
      5.5.3. Batteries.....26
         1. Lithium-ion Batteries.....26
         2. Lithium Polymer Batteries.....26
      5.5.4. Micro USB charging port.....26
      5.5.5. Headphone Socket.....26
      5.5.6. SIM Card Holder(s).....26
      5.5.7. MicroSD Card Holder.....26
6. Tablets and iPads.....27
7. Computers.....27
   7.1. Design.....27
   7.2. Types.....28
      7.2.1. Desktop.....28
      7.2.2. Server.....28
      7.2.3. All-in-one's.....29
   7.3. Hardware.....29
      7.3.1. Manufacturers.....29
      7.3.2. Brand names.....29
      7.3.3. Models.....29
      7.3.4. Mainboard.....30
      7.3.5. Display Screen.....30
      7.3.6. Memory.....30
         1. ROM.....30
         2. RAM.....30
      7.3.7. Disk Drives.....30
         1. Speed.....31
         2. Formatting.....31
      7.3.8. CD and DVD Players and Recorders (Optical Drives).....31
      7.3.9. Interfaces.....32
         1. VGA.....32
         2. HDMI.....32
         3. USB.....32
         4. Firewire.....32
         5. IDE or ATA.....32
         6. SATA and eSATA.....33
         7. SAS.....33
         8. PCI, PCI-X and PCI Express.....33
            PCI (Peripheral Component Interconnect).....33
            PCIe.....33
      7.3.10. Graphics.....33
   7.4. Software.....34
      7.4.1. Firmware (ROM).....34
      7.4.2. Operating System (O.S. or OS)....34
      7.4.3. Apps.....34
   7.5. Languages, Keyboards and Dictionaries 34
      7.5.1. Languages.....34
      7.5.2. Keyboards.....35
         1. The QWERTY Keyboard for English 35
         2. Operation and Function Keys of the Keyboard.....35
      7.5.3. Dictionaries.....36
   7.6. Characters (Symbols).....36
      7.6.1. ASCII and Unicode.....36
      7.6.2. OS Differences.....36
      7.6.3. Special Characters.....36
8. Peripherals.....38
   8.1. Interfaces.....38
   8.2. Cables.....39
   8.3. Plugs and Sockets.....39
   8.4. Connections (hardware).....39
   8.5. SCSI.....39

U-TECH 2023

8.6. Firewire....39
8.7. USB Types....40
8.7.1. USB Type-A....40
8.7.2. USB Type-B....40
8.7.3. USB Type-C....40
8.8. USB Devices....40
8.9. Wireless....40
8.9.1. InfraRed (IR)....41
8.9.2. Radio Frequency....41
8.9.3. Bluetooth....41
8.9.4. WiFi and Mobile Internet Adapters (dongles)....41
1. USB Modem Dongle....41
2. WiFi Modem Router....41
8.10. SD and MicroSD Cards (Secure Digital Cards)....41
8.10.1. SD Cards....41
8.10.2. Micro SD Cards....42
8.11. Printers, Scanners and Fax machines. 42
8.11.1. Home printers....42
8.11.2. Office printers....43
8.11.3. Network Printers....43
8.11.4. Scanners....43
8.11.5. Fax machines....43
9. Data, Information, Files, Documents, Spreadsheets, Presentations, File Formats (Types) and File Extensions....43
9.1. Data, Information and Files....43
9.1.1. What is data?....43
9.1.2. What is information?....43
9.1.3. What is a file?....44
9.2. File Formats....44
9.3. File Extensions....44
9.4. File Formats and File Extension Table.44
9.5. Office Suites....45
9.6. Documents....46
9.7. Spreadsheets....46
9.8. Presentations....46
9.9. PDF's....46
10. Pictures – Photos – Images....46
11. Audio and Video....47
11.1. Analogue to Digital Transformation...48
11.2. Audio....48
11.2.1. Bluetooth and Wired (cable) Audio Devices....48
1. Bluetooth....48
2. Cable....48
11.2.2. Audio (Sound) File Formats (File Types .xxx)....49
1. .WAV....49
2. .M4A MPEG-4 Audio....49
3. .MP3 MPEG-3....49
4. .OGG Open Source....49
5. .AAC All platforms supported....49
6. Streaming Audio (Internet Audio). 49
7. .RA Real Networks....49
8. .RM Real Networks....49
11.3. Video....50
11.3.1. Webcams....50
11.3.2. Video File Formats (File Types .xxx, File Extension))....50
1. .MP4 Android....50
2. .AVI Microsoft....50
3. .3GP 3GPP2....51
11.4. Media Players....51
11.4.1. iPhone....51
11.4.2. Android....51
11.4.3. Windows....51
11.4.4. Mac OS X....51
11.4.5. Linux....52
12. How to use a computer....52
12.1. How to use a mouse and keyboard with a windows-style desktop computer or tablet 52
12.2. How to use a standard mouse....52
12.2.1. Moving the mouse pointer....53
12.2.2. Left Click....53
12.2.3. Right Click....53
12.3. How to use a standard touchpad (notebook/laptop)....55
12.4. How to use and '*get around*' (navigate) the computer....55
12.4.1. File Explorer (Navigation)....55
12.4.2. Main Menu/Application/Programs/Accessories/ Utilities/Settings....55
1. Applications/Programs....55
2. Accessories....55
3. Utilities....56
4. Settings....56
12.5. How to change settings in the computer 56
12.5.1. Changing the desktop....56
13. The Internet....56
13.1. Administration....57
13.2. Domain Names....57
13.3. Websites....57
13.4. Internet Browsers....58

U-TECH 2023

13.4.1. Menus....58
1. New Tab....58
2. New Window....58
3. New Private Window....58
Cookies....59
4. History....59
5. Downloads (folder)....59
6. Bookmarks (folder)....59
7. Zoom....59
8. Print....59
9. Find....59
10. Edit....59
11. Settings....60
12. Help....60
13. Exit....60
13.4.2. HTML....60
1. HTML5....61
Supported Audio Formats....61
Supported Video Formats....61
13.4.3. Cascading Style Sheets (CSS)....61
13.4.4. Plugins....61
13.4.5. Extensions....61
13.5. IP Addresses....62
13.6. Symbols and Characters used....62
13.7. Protocols and Ports....62
13.7.1. HTTP....62
13.7.2. HTTPS....63
13.7.3. URL....63
13.7.4. TCP....63
13.7.5. UDP....63
13.7.6. FTP....64
13.7.7. FTPS....64
13.7.8. POP3....64
13.7.9. SMTP....64
13.7.10. SSH....64
13.7.11. SSL....64
13.7.12. TLS....64
13.7.13. Encryption....65
1. DES....65
2. AES....65
3. RSA....65
13.7.14. VPN....65
13.7.15. VoIP....65
13.7.16. Web Portal....65
13.8. Security and Privacy....66
13.8.1. Security....66
1. Firewall....66
Ports....66
Incoming Connections....67
Outgoing Connections....68
13.8.2. Privacy....68
13.9. Building a Website....68
13.9.1. Content Management System (CMS)....69
13.10. QR Codes....69
13.11. Cryptocurrencies....69
13.12. Email....70
13.12.1. Types....70
13.12.2. Composing an email (How to make an email)....70
1. To: field....70
2. Cc: field....70
3. Bcc: field....71
4. Insert Attachment....71
5. Send an email....71
14. Networking and Communications....71
14.1. Networking....71
14.1.1. WAN and LAN....71
1. WAN....71
2. LAN....72
14.1.2. Internet....72
1. VPN's & Secure Tunneling Technologies....72
SSH....72
L2TP....72
IPSec....73
SSTP (HTTPS protocol)....73
SSL....73
TLS....73
14.1.3. Wi-Fi....73
1. IEEE 802.11 A/B/G/N/AC....73
14.1.4. Bluetooth....74
14.1.5. USB....74
14.1.6. Cables....74
1. Cat 5e - 100 MHz Speed and Performance Cabling for LAN's....74
2. Cat 6a - 500 MHz Speed and Performance Cabling for LAN's....74
3. Fibre Optic....74
4. RJ11 Telephone....74
5. RJ45 LAN....75
14.1.7. Modems....75
14.1.8. Routers....75
14.1.9. Hubs....75
14.1.10. Switches....75
14.2. Communications....75
15. Fixing Problems and Repairs....77
15.1. Software (OS's, Apps and Programs).77

UTECH 2023

15.2. Computers and Notebooks (Windows, Mac OSX and Linux).....77
15.3. Android Smartphones and Tablets; iPhones and iPads.....78
15.3.1. Android Smartphones and Tablets 79
15.3.2. iPhones and iPads.....79
15.4. Hardware.....80
15.4.1. Disk Drives, Hard Disks and SSD's.....80
15.4.2. DVD Drives (Burners).....80
15.4.3. Memory.....80
15.4.4. Cards and Slots.....81
16. Data, Restore, Recovery and Backup.....81
16.1. Data.....82
16.2. Restore.....82
16.3. Recovery.....83
16.4. Backup.....83
17. Power Supplies, Electrical, Electronic, UPS's, Chargers and Charging.....83
17.1. Smartphones.....83
17.2. iPads.....83
17.3. Android Tablets.....83
17.4. Notebooks.....84
17.5. Desktop and Server Computers.....84
18. Free Software: Apps, Programs, OS's and Utilities.....84
18.1. Computers.....84
18.2. Smartphones.....86
19. Keyboard Shortcuts.....86
20. Technology Dictionary (Glossary).....87

U-TECH 2023

1. Copyright and Disclaimer

1. All content is copyright and owned by UR TECH INDUSTRIES and copying, sharing or distributing any part or all of this ebook is not permitted, unless approval is given by the author, UR TECH INDUSTRIES.
2. UR TECH INDUSTRIES are void of any legal damages or legal liability for any loss caused by purchasing or seeking advice obtained from the information supplied in this ebook.
3. This technical handbook for understanding computers, smartphone and technology has been developed using over forty (40) years of knowledge.
4. Contact urtechindustriesasia@gmail.com
5. This ebook is FREE. If you'd like to donate money for it, you can do that using one of these methods:
    1. PayPal.com Account ID: tk1million@gmail.com
    2. Cryptocurrency using Bitcoin:
    3DhHP1zUgmZP4hHVPyd5wrCye7jkfVpJxb

U-TECH 2023

2. Introduction

Congratulations on purchasing this book, "Understanding Technology 2023 (U-TECH 2023)."

This book teaches you everything you need to know about technology from a novice to an intermediate user of technology.

In this book, we cover all aspects of computing technology and explain how modern technology devices work, as well as the history and the standards that they have emerged from. There is a dictionary (glossary) at the back section of this book, so that you can learn all of the words, acronyms and abbreviations used throughout this book and in the real world, so that you know what each part is for and how you use it.

This book allows you to understand what everything is for and which words to use, should you need to speak with a parts, sales or technical person when purchasing, replacing parts or fixing electronic equipment. UR-TECH provides you with the knowledge to be able to repair and manage devices

yourself, as well as know what to do should you need to replace something or upgrade it (usually to get something faster).

Since the industrial revolution, man has revelled in making and improving machines to make work for human beings much easier and faster. Production and efficiency have greatly increased, leading to greater profits and an increase in the standard of living for humanity.

Today, computers drive, operate and control so much machinery and equipment that we rely on them for daily living such that they've become a part of our lives. Technology is beneficial for our world, particularly in a world of change, where stability is an important factor in driving that change using innovation. Reliability of your favorite communication device, may rank as a top listing of importance for technological products of choice.

The speed of computers, driven by their microprocessor chips or 'chips,' as they're known in the I.T. (information technology) world, has exponentially (drastically) increased over the past 20 years. Chips along with hard drive and software speed improvements have enabled computers to operate much faster than what they were around the turn of the millennium (the year 2000).

Computer graphics have dramatically increased in quality, with near-real graphics now available, making for crisp visuals when watching movies and playing games.

Gamers (people who love playing games a lot) are enjoying better and better quality as time goes by and they now expect fast, high-quality graphics.

U-TECH 2023

Since the year 2000, mobile phone technology has surged, with the number of phone models and apps (applications) flooding the modern world.

Competition among rival companies for the ultimate position of first place in sales across the world market has emerged. Legal challenges for technology ownership is a realistic part of life in the ever-evolving technology industry.

Some companies have had to pay others for using their technologies without permission, yet with the phones already distributed across the world, there really was no choice to turn back and instead, move ahead as customers continue to pursue their phone of choice, expecting newer models and local support for their already purchased model.

The market has developed into a buyers shopping paradise, as more and more phone models are released with increasing frequency, making the way for a buyer's market - a wide range, better performance and competitive pricing.

Desktop computers, then notebook computers and now smartphone devices are the most popular throughout our society in 2023. People have swapped their big, bulky and heavy computers for smaller handheld phones and tablets. No more messy cables, wires, computer housing cases, big monitors or 'screens,' just a small device that you can carry around with you.

Today, the technology is smaller and faster: less volume (size), less weight (lightweight) and higher speed. All of these factors mark and serve as an indicator how far we have progressed (moved forward) over the past 30 years.

The future is looking bright and positive, given the enormous improvements in technology generally, as a whole. Faster processors made of newer materials, cheaper storage, and newer technologies in human interaction such as speech recognition, biometrics improvements and human to machine instructions. Combining all of what we know and what we continue to invent and reveal to the world, is that technology helps us as human beings to repair and sustain health, by making our lives easier and sustaining health longer than 100 years ago.

From the time we wake up until the time we go to sleep, chances are that there will be some technological device there to assist you within your daily life.

Yes, there are ongoing security and privacy issues, however given the relatively short time since the inception of this new era, we have improved how we 'patch up the holes,' that we make as we evolve along the technology trail. Managing threats and removing risks is more important than ever before. One example is Play Protect, a Google Play Store service/feature which is basically in simple terms, a certification service to verify that the download on offer, has already been scanned/ checked for viruses and/or malicious ware (malware) that could potentially infect and damage your device. New app game companies may be fraudulent in nature, by promising you earnings as real money, but then prompted to pay them around $1 to receive the payout. Theoretically illegal, but not policed by Google.

Data transfer and management possibly remains one of the largest challenges in terms of keeping it under control and managed. As data became cheaper and storage volumes have increased which means that the need for greater speed of computers but also the transfer speed over a network – cable internet and mobile internet speeds are a limiting factor for people wishing to move files that have a large size.

U-TECH 2023

Hence, the demand for faster data transfer inside (internal) a computer (or tablet and smartphone), outside (external) of a computer to another computer or device (by cable or via a local network) or outside of a computer via the internet to another computer or website.

The demand for speed and performance has increased massively, as consumers request tasks to be performed faster due to their increase in workload. Society is driving technology development through consumer requests. The world is now operating in a consumption environment where people are living longer, working more and doing more in and throughout their lives, so there are more modern digital tasks to be performed. Multi-tasking has become a requirement and machines have allowed this to be exploited as best as we can to enable simpler living on earth.

What does this mean? Well, simply put – faster machines to cope with larger operating systems (OS's), apps, storage and increased app features. All of these demand resources, which is driven by better hardware and software. Interface innovation may also have an impact on the development, as data speed transfer rates seem to be an ongoing issue. Too slow equals not fast enough and many people complain of this issue often, particularly when cables and wireless technologies such as Bluetooth, bottleneck or slow down the transfer speed rate in comparison to local speeds of the OS accessing the internal hard disk drive (HDD) or solid state drive (SSD).

The speed of the new chip driven solid state drives or SSD's, is now quite fast, however USB 3.0 is the bottleneck that slows down the data transfer speed rate, which frustrates consumers.

Firewire is faster than USB, but it never really became a commercial, standard connection option, so USB really stuck around based on popularity rather than speed superiority.

Hence there is room for a newer and faster universal connections to transfer data. Firewire could have been it, but was not adopted by manufacturers universally.

Wireless connections began to evolve into faster and faster data transfer rates. Terms such as Bluetooth, WiFi and HotSpot emerged onto the scene and made life far easier for people to use their devices, but at the same time faced security problems as the technologies emerged at the start, however improved towards the last decade of this century.

In the early days, connecting to the internet from a home or business computer was done using a dial-up modem, which would act similar to a fax, whereby the modem connected to the computer dials into another receiving modem using (over or via) the telephone line (cable) and is then authorised (authenticated) by software to be granted access to the internet by the ISP (Internet Service Provider). The last dial-up modems to be made and released were 56k modems. The 56k stood for (means) 56 kilobits per second (Kbits/s or Kbps), as the description of its transfer speed over a telephone line (cable or wire).

ISDN (Integrated Services Digital Network) was a high-speed transfer service, allowing for large files to be sent over telephone wires (cables or lines). ISDN was classified as the first type of 'broadband' internet. Broadband was born and evolved into what it is today – a high-speed internet network facility that could be accessed from any home, business or organisation.

U-TECH 2023

Today, WiFi is now easier than ever to connect a technical device to, whether it be a notebook computer, a tablet, an iPad or a smartphone – the ability to 'get online' is now far easier and more secure than it was in the developing days. Although it has its limitations, WiFi has proven successful for the world because of the convenience it provides.

Artificial Intelligence (AI) coupled with robotics are paving the way for a smarter world.

We can look forward to more automated and self-governing AI, such that they are flooded with real-life situations that make AI more, 'human.'

AI has the capability to mimic and 'learn' human behaviour, thus it is possible for AI to self-govern itself as an individual.

3. The Basics

Technology devices are divided into two (2) main categories:

1. Hardware; and
2. Software

3.1. *Hardware*

Hardware is the word used for any physical technology device, part or component. Basically, hardware is anything that you can physically touch or feel with your hands – a physical object.

Examples of computer and device hardware include: desktops , mini-towers, towers, servers, racks, mini-computers, notebooks (laptops), gaming consoles (Sony PlayStation, Microsoft Xbox), memory chips, main boards, monitors/displays, cameras, batteries, SD cards, micro SD cards, USB memory drives, cables, routers, WiFi modem routers, smartphones, printers, ink, keyboard and mice (plural of a mouse).

3.2. *Software*

Software is the word used for any virtual environment that you can see on your hardware – much like watching a movie on TV. The TV is the hardware (something you can touch) and the movie is the software (something you can view/see, but cannot physically touch).

U-TECH 2023

The main types of software are:

1. Operating Systems (OS's);
    1.1. Microsoft Windows (desktop, server and tablet)
    1.2. Apple Macintosh OS (desktop computer, server)
    1.3. Apple iOS (iPhone and iPad)
    1.4. Android (smartphone and Tablet)
    1.5. Linux (desktop computer, server, webserver, Android)
2. Applications (apps)/programs; and
3. Firmware

The **operating system** (OS) operates the computer or device, usually visible or visually seen and accessible in the form of a visual virtual environment viewed upon a graphical user interface (GUI) such as a display (monitor, screen or a TV).

Applications are software programs that are pre-installed and can also be installed by the user (any person who uses the computer or device).

Firmware is software that is installed into a ROM (read-only memory) microprocessor chip.

Firmware can be upgraded by downloading it from the device manufacturer's website and installing it.

3.3. How Hardware and Software work together

Since the last half of the past century, operating systems have annexed computer hardware to work together as one which are the two main components that make up the computer. In other words, a computer is made of the physical parts which are controlled by the operating system. The operating system uses the computer hardware parts to follow instructions and execute commands that perform software (app) operations. This means, that the operating system is built of apps (also known as applications or programs on some operating systems or devices).

From the early days of IBM (International Business Machines) mainframes during the 1950's, to Apple's iOS and Google's Android in 2023, the operating system has transformed society into a brilliant new way of being able to perform human tasks used in our daily living and for productivity. Hardware and software have developed together in parallel, with manufacturers having to understand each others' products.

Generally, software should be matched to hardware capabilities. In other words, if you use an old OS such as Windows 95 to control a new computer, there may be problems with both installation of the OS or operation of both the OS and the hardware (the computer itself).

Technical Talk

Hardware is powered by either mains electrical power or battery. The software then controls and uses (operates) the hardware to perform functions or tasks that the user instructs to the machine hardware and pre-installed apps (apps that were already installed) or post-installed apps (apps that the user has installed) to then perform individual software tasks such as open a folder, read the contents of a USB memory drive, perform a function or send an email.

Software generally controls hardware on any technological device and connect to software as well as hardware, regardless of operating system used. Older systems were usually only operating one function at a time, so back then things were quite simple. Today, software performs tasks at fractions of a second.

Software and hardware work together in tandem to follow instructions from the CPU via the user or other machine(s).

Commands are directed by the user to the computer which performs the tasks required.

All contents of the OS (Operating System) and the user's documents, music, pictures and videos etc., are stored on a storage device, also known as a hard disk, disk drive, solid state drive or memory device (such as a USB drive, also known as a thumb drive or memory stick). The first discs before hard disk drives were floppy disks. Like hard disk drives which have a round disc that physically spin, data is magnetically stored onto the disks as bytes with allocated addresses (locations) by the OS.

UTECH 2023

3.4. Bits and Bytes

A *bit* is a **binary digit.** It is in the format as either a number 1 (one) or a 0 (zero). They are called *bits*. If it is represented as a 1, its command is either ON, YES or TRUE. If it is represented as a 0, it is either OFF, NO or FALSE. Electricity from the computer is released if it is a binary digit (bit) which equals 1, to turn on a device or part in your computer using transistors. This is called Boolean Logic. Logic gates are transistors which allow or restrict the flow of electricity to other transistors and to the rest of the computer or device. Each transistor has different properties that can change the state of each binary digit. These are represented in what are known as *Truth Tables* (a table of zeros and ones). A *byte* is 8 bits (8 x bits). This is how memory chunks are used in computers: bytes. Every microprocessor (or microchip) has millions, billions or even trillions of transistors, allowing the OS to process calculations and perform actions or tasks at high speeds.

Bits and bytes are data, stored by the computer on a hard drive, in memory, on an external device such as a USB memory stick or drive, MicroSD card for smartphones and computers; and on a DVD disc. The operating system organises and stores bytes at allocated addresses.

3.5. Storage, Memory and Optical Drives

The two types of memory/storage are **ROM** (Read Only Memory - a DVD, or USB Read-Only Installer Disk) and **RAM** (Random Access Memory) such as a DDR3 RAM CHIP, which is accessible by the device via the user. RAM disks are readable and writable (RW). You can only read data or information from a ROM disk or drive, however with a RAM disk you can read and write data or information to these devices. Read means that you can view or copy data or information from a ROM disk but you cannot edit or paste data or information to a ROM disk. So, on a RAM drive, you can read, write, copy, paste and edit files, pictures, audio or video – basically any type of file.

U-TECH2023

Examples of RAM disks include: hard disk drives, solid state drives, USB drives and DDR3 RAM (memory chips).

Some DVD's are readable, writable (R) and re-writable (RW), which means that they are very versatile (useful or handy) for many situations. DVD±R is a DVD that can be only written (burnt) once. The term 'burn a disc,' or 'burn a DVD,' mean to write some data, files, documents, music or videos to disc.

DVD±R is a DVD disc that can be written only once. This means that you can burn files to disc or copy another disc to this disc, but you can only do it one time and cannot delete/erase the contents of the disc.

DVD±RW is a DVD disc that can be rewritten as many times as you want. This means that you can copy files to a disc and erase them. Basically, it means you can use the DVD as a storage disc to add or remove copies of your files from your computer or change the disc however you would like to use it. Therefore, you can erase/delete everything on the DVD and then copy new files onto the disc.

ROM = Read Only Memory (readable but not writable storage space, such as internal memory, a CD ROM or a DVD ROM)

RAM = Random Access Memory (readable and writable storage space, such as a hard disk drive, solid state drive, USB drive or writable DVD disk)

Table: Optical Disc media from the past and present.

MEDIA	TECHNICAL NAME AND CAPABILITIES
CD	Compact Disc; can write data only once; store up to 700MB of data
CD-R	Compact Disc Recordable; can write data more than one time but cannot delete data (data can only be added until the disc is full)
CD-RW	Compact Disc Rewritable; can write and erase (delete) data as often as you like!
DVD	Digital Video Disc; store from 4.7 – 17GB of data
DVD-R	Digital Video Disc Recordable; can write data more than one time but cannot delete data (data can only be added until the disc is full)
DVD-RW	Digital Video Disc Rewritable; can write and erase (delete) data as often as you like!
Blu-ray	Blu-ray Disc; store up to 50GB of data such as movies

U-TECH 2023

Computers are now an important part of most businesses everyday across our world, increasing productivity and improving lives. Home and work use of computers has made our lives easier.

Stable functioning software is the objective of every software developer, although due to budget or human resource issues, apps may be released containing bugs, making the user experience from non-functional at all to working with errors or frozen states, potentially deeming them unusable. These are commonly known as ‘bugs.’

Even with apps from large companies, there may be a software ‘patch’ update release for the OS or program that you have installed on your machine or device. Most of the time it should improve interoperability, performance or add new features to an app or OS, however in some instances there may appear to be no difference at all. ‘Bugs,’ are found in software, which causes a problem for users, where some type of error or the software freezes and the computer may need to be restarted.

3.5.1. Hard disk drives and SSD's:

Hard Disk Drives and Solid State Drives have been the storage capacity devices which have had and continue to offer enormous success across the world in millions of computers and other smart devices. Smartphones all use SSD's – basically, they are all just 1 big microchip processor and one memory chip, which is where everything is stored and runs, or ***operates*** as fed into by the OS, via user input. The days of moving parts have gone. Electric has taken over mechanical!

4. Operating Systems

The first operating system was developed in 1956, by General Motors (https://en.wikipedia.org/wiki/History_of_operating_systems).

It was called a mainframe, because of the big cabinet casing that housed the computer.

It consisted of a CPU (Central Processing Unit) and memory. IBM were next on the scene and developed their own mainframe operating systems. Operating systems would develop at an ever expanding rate up until the present day.

From big to small, they have massively reduced in size over the past 66 years of development.

People are more reliant on technology than ever, driving big business even bigger, employing more people, helping lives on a daily basis and assisting the future development of new human technologies for use here on earth and in other areas of the universe.

U-TECH 2023

OS's have hugely developed during the past 60+ years, but today the variety is far greater than yesteryear with business and home consumers benefiting on a higher level compared to at the beginning, when they first appeared on the market, for sale to customers.

The two (2) main types of operating systems for all-in-one's, desktops, notebooks and servers are:

1. Commercial (Paid); and
2. Open-Source (Free)

Here is a list of the most popular operating systems used today:

1. Unix (Paid)
2. Linux (Free)
3. MS-DOS (Paid)
4. Mac-OS or iOS (Paid)

5. Windows (Paid)
6. Android OS (Paid for when purchasing the device)
7. Chrome OS (Paid for when purchasing the device)
8. FreeBSD (Free)
9. OpenBSD (Free)

There are many operating systems to choose from today.

Technology is far more compatible than what it was 25 years ago, so it is possible to install and operate OS's onto computers built or designed and recommended for a different OS originally.

For example, it is possible to install a Linux OS distribution onto an Intel processor mainboard system, designed for Microsoft (MS) Windows.

Let's take a look at these popular operating systems from the past up unto today:

1. Unix: Unix was developed as a commercial (paid) software product for sale back in the 1970's and was sold to and bought by various companies and groups. Today, Unix is owned by Novell. Unix is traditionally a command-line OS, with no GUI (Graphical User Interface), just white or green text on a screen. It's filesystem is based on a hierarchy standard, which utilises a non-GUI directory structure, similar to GUI desktop systems such as MacOS and Linux. Microsoft Windows uses a different type of filesystem hierarchy structure (see Filesystems below in Section 3.1). https://en.wikipedia.org/wiki/Filesystem_Hierarchy_Standard

    1.1. https://en.wikipedia.org/wiki/Unix

    https://en.wikipedia.org/wiki/OpenSolaris

2. Linux: Linux was invented in 1991 and today hosts the most number of internet web servers in the world, such as Apache. Linux is the graphical user interface (GUI) version of Unix. This means that it can be seen visually the same as the 'windows' style of desktop operating systems. It is fast and secure like Unix. Linux comes in many flavours, which means that it is made by different manufacturers with different models. There are so many Linux distributions. Below are listed the most popular Linux OS distributions.

    2.1. CentOS

    2.2. Chrome OS

    2.3. Debian

U-TECH 2023

2.4. Debian Edu

2.5. Fedora

2.6. Kali

2.7. Linux Mint

2.8. Novell Open Enterprise Server

2.9. Oracle Linux

2.10. Red Hat Enterprise Linux

2.11. Red Hat Linux

2.12. SUSE Linux Enterprise

2.13. Tails

2.14. Ubuntu (Ubuntu comes in many flavours)
https://ubuntu.com/desktop/flavours

2.14.1. Kubuntu (Plasma desktop with office suite applications)

2.14.2. Lubuntu (Simple and easy to use)

2.14.3. Ubuntu Budgie (Modern and fast)

2.14.4. Ubuntu Kylin (Chinese)

2.14.5. Ubuntu Mate (Traditional)

2.14.6. Ubuntu Studio (Music, Video, Graphics, Multimedia)

2.14.7. Xubuntu (Lightweight and stable)

2.14.8. Ubuntu Unity (Beautiful design)

U-TECH 2023

3. MS-DOS: Microsoft (MS) Disk Operating System (DOS) was introduced commercially in 1981 and finished public releases of its OS in the year 2000. It is incorporated into their main commercially selling product, Microsoft Windows.
4. Microsoft Windows for desktop and Windows phone.
5. Apple MacOS for desktop and iOS for Apple iPhone smartphones and iPads.
6. Google Android for tablet, TV and smartphone.

Terminals: all of these OS's used terminal applications, to write to the *kernel* (to program the computer). The kernel is the main part of the OS, which interacts with and controls: the CPU, memory, devices and applications (hardware and software). MS-DOS itself can be categorised as a terminal emulator which runs inside of the Microsoft Windows Operating System.

4.1. Filesystems

Filesystems are made of a directory structure, which means that for both non-GUI systems such as Unix and GUI systems, they are designed to be just like a physical filing cabinet from the days before computers. They include the filing cabinet (the root directory or base drive), which contain folders and then inside the folders, files are contained (stored or placed).

Basically filesystems are either:

1. Non-GUI (lines of code with no visual graphics such as Linux); or
2. GUI (visual graphics such as Windows, MacOS and Linux)

See the link below for all of the filesystems available.

https://en.wikipedia.org/wiki/File_system

U-TECH 2023

4.2. The Desktop

The desktop is a hierarchical filing and management GUI (Graphical User Interface) system which allows users to organise in order, files and folders with the freedom of movement of those virtual objects. It is a visual stepping stone into the virtual graphical world of digital electronic data management and is used across the world on desktops, servers, tablets and smartphones. It is the same style of management system, spread across a spectrum of operating systems. It powers most modern machinery.

List of Operating Systems: https://en.wikipedia.org/wiki/List_of_operating_systems

4.3. The First Desktop Operating Systems with folders

The first desktop operating systems with folders was the 'oN-Line System,' (NLS), developed by Douglas Engelbart, in the 1960's at the Stanford Research Institute, USA.

It was further developed by Xerox and then Apple Computers. The Macintosh computer proved a hit, followed by Microsoft Windows.

Linux was developed later, in 1991 and became the GUI (Graphical User Interface) for Unix operating systems..

The basic idea is that the desktop file system operates as a GUI (Graphical User Interface) presented as a 'picture,' displayed in the same way that a television set does. It is organised into a virtual desktop file management system (DFMS) environment, made up of files and folders.

Just the same as a physical filing cabinet, the windows desktop style of operating systems are designed to allow users to store files in a personalised manner - i.e., folders can be created (made) anywhere within the hard drive, using the desktop file management system. Files can be stored in any folder, if you have access permissions to open the folder. All file and folder management is operated by using a left and right click action for the left and right buttons located at the front of the mouse, when using a mouse; or the left and right buttons under the touchpad for a notebook computer.

4.3.1. Files

A file can be of any type - i.e., a .mp4 file is a video file. A .docx file is a document file etc. etc.

Files are stored, rearranged and moved according to the user's requirements of each file.

4.3.2. Folders

Much like a metal filing cabinet tower, folders act like real folders inside a real filing cabinet. The virtual DFMS, is a virtual copy of a real (physical) filing cabinet. Just like a real filing cabinet has sliding folders with paper files inside them, the DFMS also has Folders which contain Files. That is the entire window-style file management system presented as a GUI - the entire system is moulded using Folders and Files.

U-TECH 2023

5. Smartphones

The first smartphone to be commercially released was the ‘Angler,’ developed at IBM in 1992 by Frank Canova. It was the first modern mobile phone to have advanced features, including: internet access, a web browser, email, camera, picture viewer, music player, video player, games, a clock, a calendar and a flashlight.

In today’s fast-changing world, we look at the different types of smartphones in use in 2023.

We tell you the basics of how to use a smartphone and what you can do with it.

Smartphones are basically computerised mobile telephones which most of the modern world carry today. This means that they are operated by an operating system (OS), have a filesystem, a desktop, menu, apps (aka programs for Windows users) and settings like a desktop computer, but it’s on your phone. You can access files within your phone internally in just the same way as a computer as well as being able to access files from; and send to: external storage such as a MicroSD card or other multimedia memory storage unit or device.

Novices will find this useful, because there are so many technology platforms out there in 2023, that it could take an expert to know what exactly there is out there and how to use it.

Android, iOS (iPhone), Windows and Blackberry are the main operating systems (OS’s) on smartphones today. The licenses for each operating system may be different. For example, Android

is based on an open-source (free and open public license) operating system called Linux, which is basically free for anyone to copy and distribute with clause and exceptions (which means that you should not profit off it without permission from the creators), as there may be commercial license fees applicable, depending on the company, however phone companies such as Huawei, Vivo, Oppo and Samsung modify the Android operating system (OS) to match their hardware as well as add their own customised set of applications with limited software updates and firmware (hardware encoded software) updates. These manufacturers that use Android OS's, custom tailor each phone for the most recent and stable version of Android and vice-versa: that is to say, the current stable Android operating system release at the time of each model's development, is customised to match the hardware of the phone under production.

Most modern smartphones have multi-functionality powered by gigahertz plus processors with long lasting batteries off charge. Typically, a new modern smartphone could have:

- 64-256 Gigabytes (GB) of internal storage memory
- 1 or 2 x Micro SD card memory slots
- 2 x SIM card telephone service slots (dual SIM card)
- 3 – 5 x video cameras (2 x front, 3 x rear/back)
- 1 x flashlight (torch)
- A fingerprint sensor (1 x rear biometric)
- 1 x rechargeable battery

U-TECH 2023

In this section, we cover a wide description of phones on sale in 2023. With the onset of COVID-19, technology has become even more in demand because of social isolation along-side an ever-increasing demand for technology, particularly with the modern generation: smartphones have become an integrated part of our modern generation. People are now reliant on their smartphone at all times – in other words, 24 x 7. Many people leave it switched on at night before they sleep to use the in-built alarm clock which will wake them up the next day.

The smartphone has become an essential tool for daily life in many regards, due to it's versatile capabilities and hand-readiness to operate quickly and easily, as well as the ability to access the internet. Smartphones can organise your life – for enjoyment and work. Many people now rely on their smartphones for operating their business or for their employment.

Manufacturers have created brands as their product item list, and run a series of each model such as the Apple iPhone (iOS) 12 or the Huawei P40 Pro with Android 10.

5.1. Manufacturers

Today in 2023, there are many old and new manufacturers on the mobile phone market from different countries. Once considered as the founders of mobile phones and associated technologies, American manufacturers still hold high rankings of popular handheld and mobile devices. China now stands as a strong and futuristic competitor capable of producing quality products with ample features at a reasonable price. Manufacturers seek to make a profit, so it's no surprise that there are some large companies in the world today selling mobile phones and making a lot of money.

The number of mobile phone users per country (world-wide) has grown and continues to grow at an amazing rate. Most teenagers in modern nations own a mobile telephone,

Listed, are some commercial manufacturers according to their OS (operating system) type:

1. Android: Xiaomi, Vivo, Oppo, Samsung, Huawei, Sony, Motorola plus more.
2. Blackberry
3. iOS: Apple (iPhone and iPad)
4. Windows: Microsoft, Nokia

U-TECH 2023

5.2. Brands

- iPhone
- Samsung Galaxy
- Windows Phone
- Blackberry
- Motorola
- Xperia
- Nokia
- Sony, Sony-Ericsson

With the advent of smartphone technology, most original manufacturers are still in operation, while many new manufacturers are now on the scene (mostly from China), giving consumers more choices of phone models at reasonable prices.

5.3. Models

Model names or numbers vary between manufacturers. People can pre-order the latest model, before it is released. They pay for it pre-released, so that when the model is released for sale to the public, they will be allowed to have the product as a priority, for the customer.

5.4. Features of modern smartphones

Almost all modern smartphones consist primarily of *apps* and *settings*. Those are the two (2) main categories of modern smartphones.

5.4.1. Apps (Applications – programs)

Smartphones made the era of apps happen. Apps, or applications as they are fully known as, are driving the smartphone market. The app market is huge and big business also, for those able to develop something useful and popular. Downloading apps from the Google Play Store or the Apple App Store allows people to have software/programs checked for any malicious components.

Installing as a stand-alone installer, a .apk file or the new. xapk installer file is also possible through some app developers.

U-TECH 2023

To do this for Android, you must first enable the My Files app on your phone to have access to the .apk and .xapk files. Go to ***Settings/Biometrics & Security/Install unknown apps/ then select My Files*** and then click on the '***Allowed from this source***' button to allow access to the file(s).

Some websites which have .apk files for Android, include:

- apkmonk.com
- apkmirror.com

5.4.2. Settings

The settings section of your smartphone contain everything you need to change and control your phone. The most common settings sections are:

1. Connections

1.1. WiFi

1.1.1. Creating a WiFi Mobile Hotspot

Creating your own WiFi connection is easy. Simply select Mobile Hotspot on your phone under ***Settings/Connections/Mobile Hotspot and Tethering/Mobile Hotspot,*** then ***Configure Mobile Hotspot*** from the menu and create an SSID Network name, then a password (minimum of 8 characters required) and also make sure you select

the best security available such as WPA3 personal (the most secure) or WPA2 personal, if no WPA3.

1.1.2. Connecting to a WiFi network

Connecting to a WiFi is easy: all you need is the SSID Network name and the password, then press '***Connect***' and you should establish a WiFi wireless network connection.

1.2. Bluetooth

1.2.1. Bluetooth connected devices have become very popular over the past ten (10) years. Bluetooth speakers are now used across the world, to play audio from your mobile phone. Ear buds are also popular.

1.3. Flight mode

Disable all communications by turning ***Flight mode*** ON.

1.4. Mobile networks

This is simply your mobile phone company or telecommunications carrier company.

1.5. Data usage

Reports your data usage.

1.6. SIM card manager

This is where you can manage and change the name of your SIM card or turn it OFF.

1.7. Mobile Hotspot and Tethering

1.7.1. Create and modify mobile WiFi networks (called a Hotspot) to share anywhere 'on the go'. as well as sharing an internet connection by plugging in a USB cable - in this section.

1.7.2. Bluetooth tethering

This allows a smartphone to share its internet, audio and video using Bluetooth to another Bluetooth device such as another smartphone, tablet, computer or printer.

1.7.3. USB tethering

USB tethering allows a person to share an internet connection from their smartphone using a USB cable to a computer or tablet which has a USB port on the receiving end – i.e., plug the USB charging cable from your smartphone into your computer or tablet, to use the internet from your smartphone. Sharing a connection from one (device) to another is called '***tethering***.'

1.8. More connections settings

U-TECH 2023

2. Sounds and Vibration
    2.1. Sound mode
        2.1.1. Sound
        2.1.2. Vibrate
        2.1.3. Mute
3. Notifications
    3.1. Turn notifications for app actions and replies on or off
4. Display
    4.1. Brightness
    4.2. Font size and style
    4.3. Screen zoom
    4.4. Full screen apps
    4.5. Screen timeout
    4.6. Home screen
    4.7. Easy mode
    4.8. Navigation bar
    4.9. Show charging information
    4.10. Screensaver
5. Wallpaper
    5.1. Change the background image of the screen and the lock screen image.
6. Themes
7. Lock Screen
8. Biometrics and Security

    Add fingerprint biometric and face recognition security to secure your phone.
9. Privacy
10. Location

U-TECH 2023

11. Account and backup

    11.1. Google Account/ Apple ID.

    11.2. Backup to a storage device or to the cloud over the internet.

12. Advanced features

13. Digital Well-being and parental controls

14. Device Care

    14.1. Clear your memory to give you free space. Optimise your power use.

15. Apps

    15.1. Installation: go to the Google Play Store or Apple App Store and search for what app, game or movie that you want. Scroll down the list of available apps from your search. Select the one you want and if it suits your requirements, press the Install button. It will then begin to download and then auto-install by itself.

    15.2. Uninstall / Remove the app: Search for the app on your phone. Hold down the app icon that you want to uninstall/remove. A menu of options will appear. Select '***Uninstall***.' It should then be remove from your phone or device.
    You can also uninstall an app from your phone or device by going to Google Play Store or Apple App Store. In the Google Play Store, click on your account icon, then select '***Manage Apps and Devices.***' There are two (2) sub-menus:
    1) Overview: this is where you can check for any '*updates*' available for your phone or device; and
    2) Manage. Click on this section, to view all of your installed apps. Scroll down to the one(s) you want to remove, select it by touching its icon or name and then you will see the option of Uninstall. Click that button. Apple's iPhone and iPads app removal procedure is similar. They call it 'Remove app,' instead of 'Uninstall.'

16. General management

17. Accessibility

18. Software update

    18.1. Android's app updates are found as mentioned in No. 15 above: Manage apps and devices. Apple's app updates are similar to Android's. Go to the Apple App store, click on your profile icon/account, then scroll down to 'Pending updates and release notes.' Then there are two (2) choices: 1) Update only a certain app that you tap on; or 2) 'Update All.'

19. User manual

U-TECH 2023

20. About phone
    This tells you what name and version of operating system that you have on your phone.

21. Developer options
    This is where you can manipulate your phone for app building and testing apps that you have made using Android .apk files for Android smartphones. Activating Developer Options gives users access to Android smartphones, allowing users to install and test apps on their smartphones, before publishing them to the Google Play Store.

5.5. Hardware

Mobile phone hardware has obviously changed considerably since its creation from carrying around a big brick-sized handheld battery with a cable attached, to a small pocket-sized device which fits in your pocket – mobile phones, also known as ***cell phones,*** have dramatically reduced in size and made a huge advance in technologies with the invention of the smartphone. The mobile telephone has evolved into a mini computerised telephone.

5.5.1. Buttons

1. Power On/Off

The most important hardware button is the power on and power off button. This turns the smartphone on and off. You may have to press and hold down the power button for 3-5 seconds to turn on or off your smartphone.

U-TECH 2023

2. Volume Up and Down

Sound is an important element for every smartphone. Basically each smartphone features video and audio; or audiovisual functionality combined into the device.

To turn the sound up, you press the Volume Up button (+) and press the Volume Down button (-), to turn the sound down.

3. Key Combinations

You can use '*key combinations*,' to perform a certain or specific function, such as a ***hardware reset to factory settings***, which uses the phone's reserved space allocation as a system image with the default (original) settings that came with the smartphone when you bought it new from the shop or dealer/seller.

5.5.2. Touchscreens

Touchscreens replaced the physical hardware keyboards of the past on the initial smartphones which has allowed for less reliance on hardware and also giving the user more options by using a touchscreen system or 3rd-party installed keyboard. They are software or virtual keyboards (no physical hardware buttons).

5.5.3. Batteries

Batteries are what really allow mobile phones to be portable and taken practically anywhere with us. Batteries are evolving at a rapid rate, improving in the capability of staying charged for longer and longer (the number of hours and days at a time that the battery will supply charge to the phone without it needing recharging). So, batteries are staying charged for longer, charge quicker with advanced and more powerful wattage using 250 volt mains power. USB phone chargers are more powerful these days, with stronger charges and longer battery time without needing to recharge your smartphone or device.

On average, smartphone batteries are expected to last 2-3 years, although some may burn out earlier than that and some may last longer.

1. Lithium-ion Batteries

These batteries were released by Sony in 1991 and became widespread across the globe for use in mobile phones.

2. Lithium Polymer Batteries

First released in 1997, these batteries are the latest batteries used in smartphones, notebook computers and other portable or wireless devices such as drones, UPS's and electric vehicles.

U-TECH 2023

5.5.4. Micro USB charging port

This port has changed in versions and also contains brand-specific hardware designs to 'privatise' their product, as specifically 'their own brand' of USB port style (shape). E.g. - Samsung, iPhone.

The only generic shaped USB cable with associated port, is the Android standard charging port.

Micro USB	USB Type C	Lightning	Mini USB
Android phone and tablet	Google Nexus, Nokia tablet and others	iPhone and iPad	Digital cameras and GoPro's.

5.5.5. Headphone Socket

The standard size for a headphone socket (hole) is 3.5 mm. This is pretty much an international standard.

5.5.6. SIM Card Holder(s)

Modern phones have two (2) x SIM card holders and one may be combined as a MicroSD card holder, within the one holder (unit).

5.5.7. MicroSD Card Holder

These can be individual and dedicated singular holders or combined (as above) with a SIM card slot as well, together as the one holder.

6. Tablets and iPads

Android Tablets and Apple iPad series are quit a new invention that need to only charge their battery by a USB cable, which makes them easy for transporting.

The come in a variety of screen sizes and specifications. There are many Android OS tablet manufacturers and tablets available across the world. Their price has reduced dramatically, whilst their features and quality have improved.

iPad's and iPad mini's are made by Apple and hence, a part of their product range, which uses the iOS to operate their devices.

7. Computers

1. Design
2. Types
3. Hardware
4. Software
5. Symbols and Characters
6. Language and Keyboard

U-TECH 2023

7.1. Design

Computers traditionally have been 'boxed shape' or 'square-shaped,' but really its geometrical name is a cuboid.

Since the mainframe in the 1950's, the cuboid shape of computers has remained by the most part, the same and became a standard design shape for computer hardware design. The idea behind the shape is to offer protection, space and accessibility for interchangeable parts. Most commonly, memory chips (or boards), graphics cards and hard drives are the main interchangeable parts which require replacing the most. Memory can break due to various reasons such as overheating, electrical surge or mishandling it by not releasing static electricity from your body and touching it whilst fitted to the mainboard: inserting new memory mini-board chip modules or removing them, are ways in which they can '***blow***.' In these situations, memory modules such as DDR types of memory can be blown from static electricity, that has built up inside your body as you create friction (electricity) whilst walking or rubbing up against some thing or being which has electrical charge or is made by yourself. Static electricity can be released from your body, by touching an 'earthed' object or a negatively charge object or electrical source, such as a negative wire (black wires) which usually attracts the positive static electrical charge. Rubbing your feet on carpet and touching a

metal pole will release the built-up static charge from your body and transfer it to the metal, emptying or releasing the static electricity from your body to the metal. It is important to remember that you must then not walk or move when removing or inserting memory modules such as DDR or any type of microchip memory module.

7.2. Types

7.2.1. Desktop

The desktop computer really comes in several styles. Any box-shaped device, typically cuboid in shape, is classed or termed as a desktop computer. There were several types created by several companies from the 1990's and progressed towards containing more functionality to the case-housing (the physical metal and/or plastic box itself) after the year 2000 substantially. The world suddenly became in a computer frenzy over the new home machine capable of great things. Send faxes, emails, write documents and the list became endless for what was capable or possible to do on a home desktop computer. Of coarse then, the business world adapted and took advantage of desktop computing for business by buying in bulk – there were desktop machines on every desk in the office and even allocated to boardrooms.

Space, position, size and functionality became important factors when considering purchasing a desktop computer. Ergonomics starts to play an important factor or role around the year 2000. It was all about compactibility and space efficiency in the office or work place environment. Compaq, DELL and IBM made ergonomically designed desktop computers since the 1990's and sold many throughout the world.

U-TECH 2023

The desktop computer typically laid or were positioned in two (2) positions: 1) Vertically and 2) Horizontally. The 'laying down,' or horizontally layed and positioned cases were the classic desktop shape and style of computer, popular and common in homes and offices. They were common-place, everywhere. Then the positioning changed, to one of a vertically stationed layout. They were known as a 'tower.'Towers were popular, because they did not take-up or consume 'desk space,' which in the modern technological era, was becoming an issue, as more and more equipment filled up desk space. The third (3rd) generation of cuboid desktop computer case housings, were the mini-tower.

The mini-tower was exactly the same in concept as a tower, however it was roughly half (½) to three-quarters (¾) of the size (also called a 'mid-tower'). The next generation to follow, was the '***cube***', or '***mini-PC***.'

7.2.2. Server

The server is the connecting and storing point for a company or organisation, such that it is the central computing point for a group of computers or users onsite or offsite. In effect, this means that whether people were at the same physical location or were logging in remotely from the home or office. Servers typically came in the form of a tower, at first. Servers were made from quite tall and big cases which could fit in many CD, DVD and hard drives as well as have extra space for memory and connectors such as modems, SCSI or USB ports. So the server boxes had very large spaces to house (or fit) many components and provide a broad range of functionality or features.

Maintenance was quite involved, requiring constant servicing or configuring as well as data management tasks such as data retrieval.

7.2.3. All-in-one's

1. *Apple iMacs*
   The iMacs were an early compact all-in-one machine that contained only one (1) physical device, meaning that the display and whole computer were fitted into the one housing case. Basically the monitor was built into the computer case housing, so that they were technically classed as an 'all-in-one,' desktop computer for the home or office.
2. *Mini cube PC's*
   These computers emerged as a novelty at first, but held their place in the market on a smaller scale. They are still made and offer a very tiny option for owning a computer. The great thing about cube PC's, is that they are so small and can do tasks the same as a traditional tower desktop computer.

7.3. Hardware

U-TECH 2023

Hardware traditionally has been bulky and large in volume size, as well as weight.

Size has reduced and speed has increased, giving consumers more satisfaction as we head into the future of science technology and improve human ergonomics (comfort factor) and interaction (biometrics, voice commands, wireless gloves etc.).

7.3.1. Manufacturers

Some of the biggest computer manufacturers in the world today, include: HP, IBM, Toshiba, Acer, Asus, Dell, Samsung, Lenovo and others.

7.3.2. Brand names

Dell were once a big name in computing, but IBM has always had a stronghold on product and marketplace success, which is why they like microprocessor company Intel, who continue to innovate with their advances in technologies for the public with new and exciting products.

Apple iBooks proved to be popular during the 1990's until present day, alongside some of the competitors such as IBM, Dell, HP, Sony, Acer and Asus.

7.3.3. Models

Just as with cars, computer hardware manufacturers create brand names and models for sale, to generate a profit. Since 1990 – 2023, many companies have created their own popular computer hardware desktop, tower, notebook and server models for consumers with all types of demands and system requirements.

An iBook, Netbook, Notebook, or other type of computer will have its own model, the same as smartphones. The Apple iPad Mini is the model of iPad computer tablet. IBM's Lenovo has been revamped into a modern and faster notebook computer.

7.3.4. Mainboard

The mainboard or 'motherboard,' is the main circuit board which holds all the components in place, connecting to one another, surrounding and joining the CPU, hard drive(s), graphics chips and expansion slots for adding individual circuit boards or modules such as those for memory, graphics, firewire, USB, telecommunications ports (telephone, ADSL, LAN (Local Area Network) and fax.

7.3.5. Display Screen

This is the graphical interface to which you look at in order to interact with the computer or device. Since the invention of touchscreens many devices now use this form of technology as their keyboard input method. Basically, this means that the keyboard is software and not hardware. Technology has advanced a fair way, although 3-D hologram visual graphics may be the next form of technological advancement.

7.3.6. Memory

Memory has come a long way during the past 70 years. It has gotten smaller, faster and bigger in storage space. There are two different types of storage: RAM and ROM.

U-TECH 2023

1. ROM

ROM stands for 'Read-Only Memory.' This is only available for reading data and not writing data to any device or module – some examples include a DVD-ROM, a CD-ROM and Firmware attached to the mainboard of any device.

2. RAM

RAM stands for 'Random Access Memory,' and is available space to write and read data to and from a device or module, including hard drives or solid-state drives as well as USB memory drives (Flash drives or Thumb drives).

7.3.7. Disk Drives

The first drives were called Floppy Disc drives and began as a square-shaped floppy disk device. They floppy disks were 'floppy' and moveable (not rigid, but flexible in nature, except for the smallest disk, the 3.5 inch floppy disk). Floppy disks were available in three (3) sizes:

1. 8-inch;
2. 5.25 inch; and
3. 3.25 inch disks.

‘Disk’ or ‘disc’ drives have various shapes and forms from smaller, quieter and faster disk drives to floppy disk drives to heavy, hot and at times noisy hard disk drives.

The second drives were called Hard Disc Drives or HDD’s for short. The third type of hard disc drives which are currently used today for a computer are called Solid State Drives or SSD’s.

The main difference between HDD and SSD drives, is that HDD’s are mechanical drives which have a spinning disc and SSD’s have *no moving parts*, which means no friction, long life, very high speed and reliability.

Hard disks have come a very long way from slow speed to extremely fast CPU processor actions, enacted by the OS. Basically the spinning HDD’s get hot, noisy, need repairs, break-down and are slow.

SSD’s are basically one big microchip, similar to a USB drive, but much bigger.

So the technology has travelled far in terms of utilising microchips to imitate a HDD.

SSD’s are brilliant because they have no moving parts, which means that they do not wear out from friction or ‘wear and tear’ and are lightning fast.

1. Speed

Generation one of HDD’s began at 5400 RPM (revolutions per minute).

Generation two of HDD’s were 7200 RPM, generation three of HDD’s were 10,000 RPM and generation four (4) of HDD’s were 15,000 RPM, before SATA was introduced.

U-TECH 2023

2. Formatting

Formatting of hard drives (HDD's) is much slower than the formatting of SSD's.

Formatting is a slow process, if a low-level (zero all data) format is undertaken. The 'quick format' option is the fastest but does not completely erase all of the data (which is good if you wish to recover any deleted data, using computer forensics tools).

7.3.8. CD and DVD Players and Recorders (Optical Drives)

As audio and video technologies advanced onto optical discs, the hardware to play and record them also advanced – simultaneously or together at the same time so that they can be used with optical disc drives.

The modern DVD rewriteable recorder players, can do just about everything you need to with sound, movies or data. You can now write, read, erase or copy files and folders to a DVD – practically anything you need to do with these mediums is now possible. This extends to data – so any type of file can be stored on a DVD.

Notebook (laptop) computers are built with CD or DVD slots for their player recorders. So, what this means is that just the same as a notebook battery, it can be unlocked and removed or replaced with a new one from the manufacturer or computer parts supplier.

Apple were one of the first companies to remove the DVD optical drives and replace it with a USB-C port.

7.3.9. Interfaces

An interface is a physical hardware connector piece which allows for one device to connect to and communicate with another device. For example, SCSI, Firewire and USB are interfaces. Interfaces will require some type of software in order to be able to use it. For example: USB is a hardware interface that is built into almost every computer or notebook on earth, but requires USB software to be able to use it. Your operating system will have USB drivers and any other software which requires USB integration so that the OS can function using USB connections. Any USB 3rd party software from the manufacturer *may* also be needed, in order to provide USB functionality for a device connected to the computer or device.

1. VGA

VGA or Video Graphics Array, came onto the scene in 1987 brought to us by IBM as a graphics standard.

2. HDMI

HDMI or High-Definition Multimedia Interface is a standard for high-speed and quality video and audio transfer between computers (as well as tablets) and displays or monitors. HDMI is a modern interface, first developed in 2002.

U-TECH 2023

3. USB

The Universal Serial Bus (USB) interface connection port and plug were first introduced in 1996 as USB 1.0. USB 2.0 was available in 2000 and USB 3.0 was available in 2008. Today, computer hardware technology now supports USB 3.0 (USB version 3.0).

The speed has greatly increased from v1.0 to v3.0.

USB connectivity has become known as the main physical connecting interface technology on the planet today. We charge our mobile phones using USB, connect printers to our notebook via USB and connect our phones and computers together for transferring (moving or copying) files across from a mobile phone to a notebook or desktop/tower/server computer. See also the *Peripherals* section on USB for a complete breakdown of the different types of USB.

4. Firewire

Firewire became an interface type, developed by many companies - primarily Apple and Sony in 1986.

5. IDE or ATA

The first ATA (AT Bus Attachment) connection interfaces for hard drives were renamed under a new name to IDE (Integrated Drive Electronics). So the interface was IDE. The disc drive labelled as an IDE Hard Disk Drive.

6. SATA and eSATA

Serial AT Attachment and External Serial AT Attachment were introduced in 2009 and seen as the main standard of connector for HDD's and SDD's.

7. SAS

Serial Attached SCSI is a relatively new interface, developed in 2004, it has achieved higher speed and other improvements in comparison to SATA interfaces. These are good for servers with high volumes of data.

8. PCI, PCI-X and PCI Express

PCI (Peripheral Component Interconnect)

PCI, PCI-X (Peripheral Component Interconnect eXtended) and PCI-e (Peripheral Component Interconnect Express) launched onto the scene in 1992, 1998 and 2003, respectively and decades later are still used and considered the standard of interface connectors for mainboards. PCI board slots gave board/card manufacturers an interface that was and still is, widespread, allowing for greater development of PC technologies. Gamers typically enjoy building big gamer towers with more speed and greater volumes. PCI was adapted very well across the world and is virtually on every motherboard.

PCI mainboard slots are great because you can insert almost any usual or unusual device to your computer tower or mini-tower, giving people flexibility to explore their hobbies or business interests right at home or in their office.

U-TECH 2023

PCIe

The PCI Express or PCIe became quite popular because of its compact size.

It was used for several years before losing market interest from developers and manufacturers.

7.3.10. Graphics

Graphics resolution has dramatically increased and improved since its first inception.

High Quality visuals with fast performing standalone graphics processors power the latest hardware-resource demanding games and movies for a richer picture and experience. In the beginning, graphic resolution and fine quality was not established like it is today in 2023.

High resolution and smooth graphics are standard in the new smartphone era.

7.4. Software

Software is all virtual – that is (i.e.), we cannot physically touch it. It is only something that we can see and hear operating through the hardware, processing its commands. So in effect, software controls hardware rather than hardware controlling software. Hardware will interact (communicate) with software, but software controls hardware. Software is very powerful and can be used to connect to hardware over the internet to a remote location and control it. This makes software, extremely valuable in the computing world because, being able to control a device from a remote (distant) location, gives a user (a person) control over a machine or machines that can be used for many purposes.

Software exists in these three (3) formats:

7.4.1. Firmware (ROM)

Firmware is used only by the computer and embedded into a microprocessor chip called the BIOS. It can be upgraded.

7.4.2. Operating System (O.S. or OS)

The operating system, or OS, is the main software that operates (‘runs’) the computer. Some examples of an operating system include: Microsoft Windows, Macintosh OSX, Linux, Google Android and Apple iOS (iPhone and iPad's).

U-TECH 2023

The first OS to be invented was called the GM-NAA I/O and was created by General Motors and North American Aviation in 1956 for use on an IBM (International Business Machines) mainframe computer.

7.4.3. Apps

Apps, also known as applications or programs, are what we use to undertake tasks to satisfy our needs – for work, relaxation, interest, pleasure or entertainment. Applications are essentially programs that do tasks for us. An internet browser, a text document writer, an email app, photo-editing software or other apps are usually installed in with the OS so that you can use it on your OS.

Before smartphones, applications or programs were available in either Microsoft Windows or Apple Macintosh versions – the two (2) main manufacturers of OS software in the world up until the early 2000’s.

7.5. Languages, Keyboards and Dictionaries

Software language support has developed over the years, with most languages and dictionaries now supported by major operating systems and office suite software applications on offer.

7.5.1. Languages

Commercial (paid) and open-source (free) operating system software and office applications support most languages or are increasingly adding languages to include every language and

dictionary. For example, the English language is available for selection in many variants of the English language, including: Australian, British, American or Canadian. To change the language or add languages, this section is usually classified under Language, Region, Locale or Input headings, depending on the operating system.

7.5.2. Keyboards

If you install multiple languages in/on your device, you should be able to switch between languages from your desktop taskbar or in your settings section. This can also be done from your keyboard. Most smartphones have this feature as a button to press and toggle between input languages.

1. The QWERTY Keyboard for English

The 'QWERTY' keyboard layout is a very old and traditional keyboard layout that has undergone modifications over the years. First introduced in the 1880's onto typewriters, its name derived from the first six letters on the first row of the keyboard. The QWERTY keyboard is what modern English language computer and smartphone keyboard layouts use across the world in 2023. It is the original layout design for the English language and remains an international standard keyboard layout, today.

U-TECH 2023

2. Operation and Function Keys of the Keyboard

KEY	USE
Alt	Used with F (Function) Keys (at the top of the keyboard: F1-F12), Ctrl and Shift keys to perform actions. A helpful action to close any window or app as well as shut down the computer, is Alt + F4.
Multi-Function Key	Also called 'The Windows Key'
Fn	Function key
Ctrl	Control key
Shift	Shift key
Caps Lock key	Caps Lock key is used to change all lettering to UPPERCASE (CAPITAL LETTERS)
Tab	Tab key is used for moving to the next insert point in a document
Esc	Escape key is used for exiting a document, application or active user session (to quit from something that you are using)
Del	Delete key is used to delete one character in a backwards direction (moving left) or multiple characters when selected
Backspace	Backspace key is used to delete one character at a time moving in a backwards direction (moving left)
See https://en.wikipedia.org/wiki/Table_of_keyboard_shortcuts for more information.	

7.5.3. Dictionaries

Dictionaries are usually contained within word processor applications (software), under the heading of 'Spelling,' which may also be termed or phrased as a 'Spell Checker.'

To access the dictionary, within your word processor, click on the Spelling icon or button.

A pop-up dialog box should appear. In this box, you will have many options to change the dictionary and to 'add' new words to your dictionary of choice.

7.6. Characters (Symbols)

7.6.1. ASCII and Unicode

ASCII (American Standard Code for Information Interchange) was one of the first character coding systems invented that used 128 code points, of which only 95 are printable. Unicode has millions of code points and incorporates ASCII as the first 128 code points in its set. Because Unicode contains many more code points and characters, most computers today use Unicode.

7.6.2. OS Differences

U-TECH 2023

Different OS's use different symbols to other systems for the file system structure.

The first main difference is between Microsoft DOS or Windows and; Unix, Linux and Apple Mac OS's.

Basically, MS DOS uses a backslash for its directory structure and Unix style OS's use a forward slash, the same as what a URL in a web browser does.

Platform/App	Example	Slash
WWW	http://website.com/about	/ (forward-slash)
Apple MacOS/Linux/Unix/	/home/user/documents	/
Microsoft Windows	C:\Users and Groups\	\ (back-slash)

7.6.3. Special Characters

Technologies have made full use of the QWERTY keyboard special characters. The most commonly used characters used on the internet include the @ (at) and # (hashtag) symbols.

List of Special Characters on a QWERTY Keyboard Table

Special Character	Name: Meaning	Special Character	Name: Meaning
~	Tilde: about, approximately or	=	Equal: used in software development;

	roughly		mathematical operator
`	Accent: some non-English words use accents to highlight a letter or sound	**{**	Left squiggly bracket: used in software development
!	Exclamation mark or point: A punctuation symbol used to express surprise	**}**	Right squiggly bracket: used in software development
@	At symbol: used in emails to indicate transmission of data to a certain domain	**[**	Left square bracket: used in software development
#	Hash: used in software development and on social media to declare a hobby, interest, username or group name	**]**	Right square bracket: used in software development
$	Dollar sign	**:**	Colon: used in URL's, such as http://www.example.com; or ftp://ftp.example.com
%	Percentage: a fraction represented by whole and decimal numbers	**;**	Semi-colon: used in software development
^	Exponent: used in a mathematics equation to represent the power of a number	**“**	Double-quotes: used in titles, or written speech
&	Ampersand: a symbol meaning the word 'and'	**‘**	Single Quote: used to describe the name of something such as 'U-TECH 2023'; used as an apostrophe in punctuation
*****	Asterisk: star symbol or mathematical multiplication symbol	<	Left angled bracket: used as a starting symbol to commence HTML language code
(	Left rounded bracket	>	Right angled bracket: used as a finalisation symbol for HTML

U-TECH 2023

			language code to close the command or operation
)	Right rounded bracket	,	Comma: used in punctuation to list items, names, places etc.
-	Dash, Hyphen or Minus sign (mathematics)	.	Full-stop or Period: used to separate domain name parts such as www.example.com; used as a symbol to represent the finalisation of a sentence in punctuation
_	Underscore: used for naming files like U-TECH_2023.pdf	?	Question mark: used in query computing database commands; a punctuation symbol used in a question
+	Plus: addition mathematical symbol	/	Forward slash: used in MacOS, Linux & Unix OS directory structures; and in website addresses, such as http://www.example.com/
|	Vertical bar: used to separate text	\	Backslash: used in Microsoft directory structures

U-TECH 2023

8. Peripherals

A peripheral is categorised as any externally connected device to a computer, network, tablet or smartphone. Technological devices are divided into two (2) categories: 1) wired or cabled; and 2) wireless (no cables or wires). So basically a peripheral device such as a mouse, keyboard, monitor, external hard drive, printer or other attached device to the computer, tablet or smartphone can either be connected via (using) a cable of some type with some type of connector, such as USB, or it can be connected wirelessly, such as InfraRed (IR), Bluetooth or radio frequency (RF). So there are a number of ways to connect peripheral devices to a computer, tablet or smartphone.

8.1. Interfaces

Interfaces are the facing part of a component to be extended or added on to. Past interfaces include: SCSI (pronounced /scu-zee/), to current day interfaces such as U.S.B. or USB, the acronym for

Universal Serial Bus connector interface. These interfaces allow for connecting devices together for either electrical charging purposes or for data connectivity.

USB still remains one of the most frequently and widely-used interface technologies today in 2023, with most technological devices incorporating some type of USB port to connect it to some other device or for some other device to connect to it. Versatility is the main advantage using USB as an interface to perform tasks.

Interfaces can be located on the mainboard inside the computer, on the outside of the computer (externally), on other devices such as modems or routers or on cables with plugs and sockets.

Common interface connections include: connecting your mobile phone to your computer or connecting a battery storage pack device to your mobile phone to charge up your mobile phone.

8.2. Cables

Electric cables carry between 230-250 Volts (V) for mains power supply. 230-250V is a commonly used voltage by consumers in the home or business, across the world. Some devices use two (2) electrical pins and some use three (3). The third pin acts as an earth, which some devices require.

8.3. Plugs and Sockets

Plugs are divided into two (2) main types: male and female.

So, when requesting a part for your computer, phone, tablet or cable, consider whether its interface connection is male (a plug of some type) or female (a socket of some type).

U-TECH 2023

8.4. Connections (hardware)

There are many types of connections in a computer, phone and tablet, although each differ in the type and amount of connections used within. Some use pins with slots and the materials are copper, steel, solder, alloys, silicone and plastic.

8.5. SCSI

SCSI, pronounced */scuzzy/*, was first introduced in 1981 which proved a popular interface connector to connect certain devices including scanners and printers with computers. It was used by many advertising companies because of its robustness and up to 60 Mbps data transfer rate with 16 devices connected. SCSI phased out and is no longer used in modern computing.

8.6. Firewire

Firewire was created to a standard, the same as USB and other types of technologies, which aim to develop the technology and utilise it worldwide. Manufacturers usually adopt new technologies which have been standardised - which pretty much means that it has been created for commercial use.

Firewire never really kicked off as the new popular technology, unfortunately, because it is fast and potentially had scope for improvements.
Microsoft Windows 10 stopped support for Firewire however there may be workarounds to get it working, so I hear online.

Linux has full support for Firewire devices and connections.

8.7. USB Types

There are three (3) types of USB devices:

8.7.1. USB Type-A

This is the original USB connection: flat-headed and rectangular in shape.

8.7.2. USB Type-B

USB Type-B are a group of square shaped connectors with rounded edges. These are most commonly used for connecting printers and storage devices to desktop, notebook or server computers.

8.7.3. USB Type-C

USB Type-C are the latest USB connections to be made – small, slimline and rounded like USB Type-B.

U-TECH 2023

8.8. USB Devices

Universal Serial Bus or USB, commenced as USB v1.0 in it's initial release and is now currently set at USB v3.0, released in 2008.

Most devices or peripheral accessories today are USB 2.0 or USB 3.0.
They come in many shapes and sizes. The price has reduced dramatically and the variety has increased.

8.9. Wireless

Radio frequency (RF) communications have been used for a long time with devices and systems such as 'walkie-talkies,' two-way hand helds, CB (citizens band) radio, radio stations and now WiFi.

RF technologies and communications or 'comms,' have come a long way since their inception more than a hundred (100) years ago. RF is used within many industries including the medical and industrial fields. Bluetooth uses RF technology to connect audio and video between externally connected peripheral devices. It is all wireless technology, but each connection type uses different methods to connect using radio frequency.

8.9.1. InfraRed (IR)

InfraRed remote controllers have been used for a long time. Most TV's are operated wirelessly, or remotely, using a remote control which uses IR to send instructions or commands, to the TV, such as ***volume up*** or ***volume down***. IR is simply a red beam of light, which is emitted (sent) with encoded binary information to a receiving device, that allows a remote control to perform certain commands, such as: change the channel up or down, increase or decrease the volume and others, particularly with TV's (televisions).

8.9.2. Radio Frequency

RF has played a big part in connecting devices together for use in medicine, industries, the office and the home.

8.9.3. Bluetooth

Bluetooth technology connects devices using UHF RF (Ultra High Frequency Radio Frequency) and allows for the transmission of data such as audio and video from a device such as a smartphone to a receiving Bluetooth device. Many devices today are Bluetooth enabled – that is, they have Bluetooth built-in to the device. Some examples include: speakers, printers and notebook computers.

U-TECH 2023

8.9.4. WiFi and Mobile Internet Adapters (dongles)

WiFi has become the popular convenient word during the past 20+ years, with WiFi routers popping up in every shop, business and home. Small local networks can attach a WiFi modem router and get online using cable internet (optic fibre) or wirelessly.

1. USB Modem Dongle

These are mobile devices used for notebook computers or tablets to dialout and connect to a mobile network to access the internet using prepaid or account services for 3G/4G/5G internet.

Each dongle is assigned an IP address.

2. WiFi Modem Router

These devices are what connect you wirelessly to the internet from inside your home, office, hotel or business. This device is one of the most popular peripherals on the planet, today.

8.10. SD and MicroSD Cards (Secure Digital Cards)

8.10.1. SD Cards

SD cards were first developed for and used with towers and notebooks for transferring files across from another device such as a digital camera, which were very popular during the 1990's before the smartphone exploded onto the scene for cameras and flashlights. The SD card was soon replaced with the much smaller, M*icroSD card*. These are popular for use in Android smartphones, cameras

and computer cradles with SD slots. SD slots can read MicroSD cards, using a ‘cradle,’ which allows the MicroSD card to ‘fit into’ the SD slot.

8.10.2. Micro SD Cards

Today, MicroSD cards have their own slot interface inside almost, if not all, smartphones. They are small and usually come with a holder, to easily slot into the phone, smoothly. Transfer files, documents, photos, music, videos or anything onto the micro SD card, then remove it (this is done by pushing the MicroSD or SD card cradle in and you will then see it eject out) and insert the card (by pushing it in once) into another device where you can use the *copy* (Control + C keys) and *paste* (Control + V keys) commands to paste the contents across, using these keyboard key shortcut commands, or any ‘*Edit*’ menu. To cut any of the contents, use Control + X keys, and those cut contents are now sitting in the memory clipboard, waiting for you to paste (Control + V) them into, or at, some location, somewhere on your computer, another drive or another computer such as one on a network (the cloud or remote server).

8.11. Printers, Scanners and Fax machines

This section is split into two parts:

U-TECH 2023

1. Home; and
2. Office

Printers like displays, have reduced immensely in size and today are conveniently sitting on our desks, not much bigger than a letter size sheet of paper. Quality and speed have improved in the name of finer printing and performance to give even home users the ability to print out very good quality images or documents at home. Convenience and productivity combined together, gives any student, business person or enthusiast an advantage in their field of interest.

Today, HP (Hewlitt-Packard), Epson and Cannon printers are highly popular; for home or small business use.

Larger office, government and large scale businesses use companies such as Mitsubishi who tailor-make high volume, quality and speed printing to get employees and workers their copies so that they can continue on with production at the organisation in a minimal amount of time.

8.11.1. Home printers

Home printers have come a long way since the 1980’s from the simple dot-matrix to the modern ink-jet desk printers for your home or office. Some of the manufacturers who are making modern desk printers for your home include: HP, Epson, Canon and brother.

8.11.2. Office printers

Office printers are usually much bigger in size and require a larger operating area, than that of home printers. Office printers: require more floor space typically, have more height, require more servicing and maintenance, cost more and print higher volumes of paper.

8.11.3. Network Printers

Printers with RJ45 LAN network ports were introduced in high volume during the 1990's and evolved into an efficient method of doing high volume, high speed printing.

8.11.4. Scanners

These days, ***flatbed*** scanners are combined with printers which also include a fax machine. Today, printers are actually made as a 3-in-1 (three in one combined) colour printer, flatbed scanner and fax machine. They may be marketed as a *printer/scanner/fax machine*. Flatbed means that the printer/scanner/fax has a glass flat screen scanning bed, to place your paper document which can be scanned and exported to your computer as a .PDF or .JPEG file, ready to email or printing in another location.

8.11.5. Fax machines

U-TECH 2023

Before computers, fax machines were only available as standalone devices/machines, however as the technology progressed over the years, they were then built into printer scanners to become a 3-in-1 printer/scanner/fax machine. The fax output tray, is where the receiving fax paper comes out of the 3-in-1 device. It may print using traditional paper rolls or A4 standard paper sheets. They still require a standard telephone cable/line and plug to fit into the back of the 3-in1 device, just as the old fax machines did. There are also online efax services available on the internet, for a fee.

9. Data, Information, Files, Documents, Spreadsheets, Presentations, File Formats (Types) and File Extensions.

9.1. Data, Information and Files

9.1.1. What is data?

Data is raw alphanumerical characters and symbols which when arranged or presented in a certain way or manner becomes useful and is called *information*.

9.1.2. What is information?

Therefore, information is readable data for humans. Without some kind or type of way or method of manipulating the data into a readable or usable way, then it is simply raw data -i.e., a string of letters, numbers and symbols.

9.1.3. What is a file?

A file is a digital version of an analogue document (paper document). So, for example, before computers were invented, people used typewriters to type (document) a message, letter or; formal or informal paper of some kind. The digital revolution changed the face of typography and the recording of and storing of written text. A new era was born and it had transformed into an electronic form of a preceded physical handheld paper form.

9.2. File Formats

File formats are really just different kinds of files, whether it's a picture, a video or a document - they're all examples of file formats. They are not the same - i.e., they are different.

So, for example, .mp3 audio files are a different kind of file format than a .mp4 video file.

Similarly, a .docx file is not the same as a .ppt file.

9.3. File Extensions

A file extension is any set of letters or numbers that go after a dot '.' which goes after the actual filename. For example: FileABC.docx is a .docx file and has a file extension .docx. The filename is FileABC.

So file extensions are the 3 or 4 letters and numbers that go after the dot (.) after the name of the file.

U-TECH 2023

9.4. File Formats and File Extension Table

File Format	File Extension
7-Zip compression file	.7z
Advanced Audio Config	.aac
Android Application Installer Package file	.apk
Microsoft Application Installer Package file	.appx
Executable Binary file (multi-platform)	.bin
Rasterized Bitmap Image file	.bmp
Microsoft Word Document files	.doc, .docx
Microsoft Word Template files	.dot, .dotx
Electronic Publication files (eBooks)	.epub
Microsoft Windows executable application file	.exe
GIF picture image file	.gif
Microsoft Graph file	.gra
Disc Image file	.iso

JPEG picture photo file	.jpg, .jpeg
Mobi file for reading ebooks on mobile and e-reader devices	.mobi
Apple Movie file	.mov
MP3 Audio file	.mp3
MP4 Video file	.mp4
Open Document Text file	.odt
Open Document Template file	.ott
Adobe Portable Document Format file	.pdf
Microsoft PowerPoint Presentation files	.ppt, .pptx
Rich Text Format	.rtf
Text file	.txt
Wave Audio file	.wav
Windows Metafile	.wmf
Microsoft Excel Spreadsheet file	.xls,
Microsoft Binary Workbook file	.xlsb
Microsoft Excel Workbook file	.xlsx
Microsoft Excel Spreadsheet Template file	.xlt
Microsoft Excel Spreadsheet Template file	.xltx
Zip compression file (also called an archive file)	.zip

U-TECH 2023

9.5. Office Suites

Software office application suites generically include a wordprocessor, spreadsheet and presentation app. They may include other apps, such as: drawing, maths or email apps.
There are several available free for download or for purchase. Some of the popular office suites include: Microsoft Office, LibreOffice, OpenOffice and some others.

microsoft.com (paid)

libreoffice.org (free)

openoffice.org (free)

Whilst Microsoft retains the label as the initial standard, most Office Suite software packages can open, edit and save any Microsoft .file extension.

9.6. Documents

The first documents were text documents with a file extension .txt

Then Microsoft introduced the first commercial word processing program called Microsoft Word.

It became and possibly still is today, the world's most popular document format - the .doc file.

The template file format and extension is .dot (dot dot).

It evolved into the .docx file (XML style of the .doc file format). It is considered an international standard these days and is recognised by most word processors today, which means that this type of file can be opened, edited and saved. The template is .dotx.

9.7. Spreadsheets

Spreadsheets have taken off (suddenly become very popular) and have become the useful tool for mathematics, science, accounting, management and business.

The generic file formats for spreadsheets are .xls and .xlsx.

The generic file formats for templates are .xlt and .xltx.

9.8. Presentations

U-TECH 2023

Presentations have become the choice of meeting presentation platform mediums, available today.

The generic file formats for presentations are .ppt and .pptx.

The generic file formats for presentations are .pot and .potx.

9.9. PDF's

The PDF document has become a document format and extension of choice, for modern-day technology users. Adobe's famous Portable Document Format, or PDF, has become an international/universal standard in document sharing formats.These days,anyone can print a PDF document file, by pressing together the Ctrl + P keys to "print" a PDF, or save as a "PDF."

10. Pictures – Photos – Images

Technology has increased the production, sending and receiving of photographs (photos). A photo can also be called, or known as, a picture or image.

There are different kinds of images. A photo is classed or termed as an image, because that is the general heading. A photo is an analogue or digital image of people, animals, nature, scenery or objects. A picture is a painting or drawing of something or someone.

The messaging or emailing of photos has become a past-time, meaning that it has become popular and normal amongst the population or people.

Photo manipulation or editing, has become almost a ‘best-seller’ in terms of becoming very popular. Just like the phrase ‘Google it’, ‘Photoshop it,’ or ‘it’s been Photoshopped,’ have become popular sayings. It means that the image has been ‘touched – up,’ similar to air-brushing or like the auto paint shop to repair your car’s paint or exterior body. This term comes from the all popular software program called Adobe Photoshop. People can use apps to change or manipulate a selfie or other photo on their smartphone. This feature or function is very popular these days among people, particularly young people , to remove any skin blemishes or unwanted backgrounds.

The most widely used photo formats are: .gif, .jpeg, .jpg and .png files. They are commonly used across the world these days. These file formats are the most popular format for images on smartphones, tablets, computers and the internet. They are used in messaging apps and email for people to send and receive pictures or photos – virtually anything taken with your digital camera on your smartphone or camera.

11. Audio and Video

Audio and video have both progressed side-by-side throughout their development from the 1950’s until the present day. Digital audio has changed the complete audio, music and video industries since its inception in the 1990’s. Audio has transformed from analogue vinyl records to digital MP3’s.

U-TECH 2023

Sounds have changed from being played in/on heavy record players to small and lightweight smartphones.

Video has progressed from a simple fluorescent green texted terminal for mainframe computers, to touchscreen high-resolution video screens projected to the user on glass (smartphones or tablets and some all-in-one computers). Today, there are far more choices of what you want compared to what there was available back in 1960.

So we can have more choices suited to our individual needs and/or requirements in the home or at work. Now more than ever...movies, games, videos, photos and music are all capable of computerised high quality: high performance graphics and crisp equalised audio tracks – the capabilities are far more advanced now. Now we can stream video and audio across a wireless WiFi network while playing it from somewhere across the other side of the world – all across the internet in real-time.

It’s quite spectacular in what humans have achieved with online technologies in only a relatively short span of time. Quite amazing achievements have been made in only one single generation.

Streaming video and audio (sound) to an iPad, a notebook, a Google phone, an iPhone and to a tablet are all possible today, thanks to advances in technology. So, understanding the technology is important in understanding what is going on, so that your experience with using the device(s) or technologies is as easy as possible to take full advantage of it, as well as fully enjoying whatever it is that you wish to use and enjoy.

11.1. Analogue to Digital Transformation

The old CRT TV's and monitors have disappeared from the shops and have been replaced by digital screens. So what was the difference between the two (2)? Well, basically analogue means a moving physical signal or image of some kind, such as: time, sound, a picture or a movie.

So for example a wrist watch with moving hands is an analogue watch. However, a watch with a screen displaying digits is a digital watch, because it is all electronic with no moving parts (no hands, in this example). The same theory goes for phones and phone calls, satellite TV, ADSL, WiFi, and Bluetooth – almost everything has switched over into a digital signal or format.

Cable technologies were traditionally analogue which analogue-to-digital and digital-to-analogue converters such as a telephone line to an ADSL WiFi Router box

Analogue (Analog) = long wave signal, with moving part(s) or non-electronic.

Digital = short wave signal, without moving part(s) or electronic.

Basically analogue (analog) means mechanical, electrical or moving and digital means electronic (non-mechanical or non-moving).

The traditional technology used to send radio wave signals is analogue – it is called Radio Frequency or 'RF.' Today, RF is transmitted and received in digital format also.

RF has been around for a long time, however the modulation is digital which basically means that the data is controlled and digitised before it is sent. At the receiving end, the digital data can be converted back into an analogue format, usable by the receiving device.

U-TECH 2023

11.2. Audio

Sound has evolved considerably with technology, allowing machines to create, change and send music or any other sound.

Audio files such as .mp3, .WAV, .AAC and other audio file types are available for use with computers and smartphones or other devices such as MP3 Bluetooth speakers.

11.2.1. Bluetooth and Wired (cable) Audio Devices

1. Bluetooth

This is possibly the most popular of Bluetooth device – the Bluetooth speaker. These 'combo' speaker units are quite amazing, in that anyone can carry sound with them '*on-the-go*.'

2. Cable

Cable audio is still highly popular, because of stability and reliability.

11.2.2. Audio (Sound) File Formats (File Types .xxx)

1. .WAV

WAV (pronounced /*wave/*) files are a music industry standard in the recording studio business. Dot WAV (Waveform Audio File) formatted files are usually uncompressed analogue or digital mono audio tracks. Developed by IBM and Microsoft back in 1991, it quickly became popular amongst sound recording engineers and studios, being the preferred format for audio tracks in the studio.

WAV was and still is ‘raw’ sound, which means that it is basically untouched since/after it was recorded.

2. .M4A MPEG-4 Audio

Apple’s main audio file format is the .M4A which it promotes as its primary audio format.

3. .MP3 MPEG-3

The dot m-p-three audio format is one of the most popular audio file formats for sounds across the globe. These have been around a long time and can be used in almost any computer, tablet or smartphone.

U-TECH 2023

4. .OGG Open Source

This file format allows for streams, pictures, audio and video. It is open source, so it is not widely distributed like other apps. It has Android and iPhone support (supported on those devices).

5. .AAC All platforms supported

Advanced Audio Coding is supported by all smartphones and computer audio software to allow for great compatability across all devices, making it a standard, or universal, in effect.

6. Streaming Audio (Internet Audio)

Real Networks created a streaming protocol RTSP (Real Time Streaming Protocol) and also made their own downloadable or pre-installed Real Player. Real Player was quite popular during the 1990’s into the early 2000’s, until the iStore, Spotify and other app sites boomed in popularity. Today, you can stream video meetings/chats, radio stations and virtually whatever you want using audio and video. The amount of video chat apps available on Android and iPhone is astonishing.

7. .RA Real Networks

Real Audio files emerged in 1997 as an audio format for streaming audio (sound) over the internet.

8. .RM Real Networks

Real Media files combine Video and Audio together, such as movies and videos streamed over the internet.

11.3. Video

Ever since digital photographs were first used, quality has been defined by how ‘fine’ the picture detail is, which is correlated (related) to how much data or large the picture size will be.

DPI or ‘dots per square inch,’ became the standard term, used frequently to describe the resolution of screens, pictures and printers. The more dots per square inch, the sharper the image and finer or higher the resolution, which equals better quality.

PPI or ‘pixels per square inch,’ increased in numbers and so video development achieved high resolution graphics for TV’s, smartphones and monitors.

11.3.1. Webcams

Webcams are a popular peripheral that are increasing in quality (video resolution [definition]) and also include a microphone to record your voice.

Webcams record video in real-time for video chat and meetings using apps over the internet.

They are connected via a USB cable to your computer's USB port. They provide video and sound into your computer and then onto your recipient at the other end of the chat or meeting session. HD or High-Definition video emerged in the 1990's and the video quality is now higher with more definition or pixels per square inch (ppi).

U-TECH 2023

Display Resolutions:

720p HD Ready! (HD 720)	1280 x 720 pixels
Full HD (HD 1080)	1920 x 1080 pixels
Ultra HD 4K (4K UHD)	3840 x 2160 pixels

11.3.2. Video File Formats (File Types .xxx, File Extension))

1. .MP4 Android

MPEG-4 is a very popular format used for making videos or movies. Dot m-p-four files are of the most widely used video file formats across the world.

2. .AVI Microsoft

The Audio Video Interleave file format was introduced by Microsoft in 1992 as a new video file type. It was incorporated into Microsoft’s Windows operating system as the main video format that can be played on the Windows Media Player program, preinstalled with Windows. People could store .avi movies onto their computers or onto CD’s.

3. .3GP 3GPP2

3GPP .3gp video files are supported on most smartphones, which means that they will play on most phones, using a supporting player such as VLC media player (a multi-platform and multimedia file format video and audio player).

11.4. Media Players

Since the 1990's, software media players for computers, and now smartphones, has moved from platform dependency such as either a Microsoft Windows format .avi or Apple Macintosh .mov to multi-platform players which support the new .mp4 video format.

So for a long time, there were media player compatibility issues, just the same as with Microsoft Office applications (Word, Excel, PowerPoint, Outlook etc.) that opened, edited or created on Microsoft Windows OS's versus opened, edited or created on Apple Mac OS's.

11.4.1. iPhone

iTunes is the default media player for iPhone. You may need to sign in to your account to use this app. It can be used to listen to music, purchase music, watch videos, purchase videos, backup and restore your Apple device.

U-TECH 2023

11.4.2. Android

Google Play Music was introduced as Android's default music player in 2011 and was replaced in 2020 by YouTube Music as the default music player.

Gallery is the default app for viewing photos/pictures/images. Inside the Gallery app, you can preview videos such as .mp4 and then fully open the video by pressing 'Play video,' to open the Video Player app and watch the video in full screen mode with sound.

11.4.3. Windows

Windows Media Player was the original default media player built into its Windows Operating Systems up until Windows 8.1. Then in Windows 10, Microsoft replaced it with Groove Music and Microsoft Movies & TV. In Windows 11, these have been replaced with Media Player.

11.4.4. Mac OS X

QuickTime player is the default media player for Macintosh OS X that can play audio and video files. To watch videos, there is a preinstalled app called *DVD Player*. as well as i*Movie* and *iTunes* apps, which can be downloaded free from the App Store. So there are several options to watch movies on your computer or stream them online.

There is also a music app included called Music to play music and an app called Photo Booth to record videos and audio with.

11.4.5. Linux

VLC Media Player is a multi-platform media player, open-source (free) and is available for Windows, Mac OS X, iPhone, Android and Linux. This makes it one of the most popular media players for download, today. It is installed by default on many Linux distributions, including Ubuntu Studio.

12. How to use a computer

Computers are operated by the user(s) (a person or people who use the computer), by using input devices such as a mouse, touchsreen and keyboard. Navigating (moving to where you want to be) throughout the computer to complete tasks (actions), gives the user freedom to access and use many features and functions of the computer. A user can change settings of the hardware and software, write documents, store photos or send emails. Navigation skills allow users to utilise the full capacity of the computer, its capabilities and benefits that it provides. Trial and error may occur when training to use a computer, so it s recommended to not change too many settings if you are a beginner. Over time, you can develop and improve new computer skills, giving you more knowledge of how to use the computer which will in turn, then increase your ability to do more things that you want to do on the computer and with the computer. The internet is the biggest source of openly available information medium today. You can search for how to fix a problem and investigate by yourself, the solution. Knowing what keywords to use in Find or Search functions, will give you the advantage of getting the answer quickly.

U-TECH 2023

12.1. How to use a mouse and keyboard with a windows-style desktop computer or tablet

The use of a mouse and keyboard are the basic requirements for a user (person) to operate (use) a windows desktop computer or tablet. All operating systems, including Microsoft Windows, Apple Macintosh, Apple iOS, Linux and Android, use a click or tap function operation to perform simple navigation and to complete tasks, such as: opening a folder or file, moving or copying a file or folder, opening an app or changing settings.

12.2. How to use a standard mouse

A modern standard mouse is typically made of a body (which fits into the palm of a person’s hand), a left-click button (located at the front of the mouse) and a right-click button (also located at the front of the mouse). A user moves the mouse body using their hand, which moves the mouse pointer to where a user (person) wants to perform some action, function or change some type of setting in the computer.

12.2.1. Moving the mouse pointer

The mouse pointer (typically the shape of a triangular-shaped arrow) is how a user (person) uses the computer: by moving the mouse pointer into the position where the user wants to perform some action. The mouse pointer is used for selecting a file or folder (by hovering the mouse pointer over the top of it [above it,]), navigating (moving) through a menu of options to '*get to*' a menu option which performs some function such as: to change a setting or open a program (app/application), selecting a file or folder (by clicking on a file or folder once [one time] using the left mouse or touchpad button), opening a file or folder by double-clicking on it, moving a file or folder by first selecting it with one click of the left mouse or touchpad button then holding down the left-click mouse or touchpad button and dragging it (the file or folder by dragging the mouse whilst holding down the left-click button) into the position where you want to move it to (relocate it to) or right click on a file or folder to perform secondary functions or actions, the mouse pointer is the main desktop file operating system feature, which people use to operate the computer, allowing them to do what they want.

12.2.2. Left Click

Most computer operations are conducted using the 'Left-Click' button on a mouse or touchpad. 1-click will select ANY file or folder, however, only Double-Clicking each file and folder will either open the file or that folder.

U-TECH 2023

12.2.3. Right Click

The Right-Click function (or feature) presents (gives) users options – as a listed menu of options.

Typical options include:

- Open: Open that file or folder
- Open in New Tab: Opens that file or folder into a New Tab.
- Open in New Window: Opens that file or folder into a new Window.
- Open With: Gives the user a selection of choices of how or with what you would like to open that file or folder with.
- Send To: This function gives the user options of sending that file or folder to another location, such as a USB drive, a DVD or their second drive (e.g. D Drive, E Drive or F Drive). Basically this function allows a user to send any file or folder to another location, other than their OS drive location (which is usually the C Drive for MS Windows OS's), however, it can also be sent there.
- Cut: Ctrl + X = remove that file or folder
- Copy: Ctrl + C = copy that item, which can be 'pasted' (Ctrl + V) into another location.
- Paste: Ctrl + V = paste a file or folder into a folder or location.

- Move to Trash: Move that selected file or folder into the trash for Deletion (Empty, Erase or Delete).
- Rename: This is a valuable feature, which allows the user to ‘rename’ the file or folder to a new name. Very handy!
- Create Archive: Gives the user the option of compressing that file or in particular, a folder, a compression format such as .zip. This means that the file or folder is ‘crushed’ or *compressed* into a smaller size, which is particularly useful for minimising storage or sending via email (good for saving space or size).
- Find/Search in this Folder: Ctrl + F. This function gives the user the option of being able to search inside that folder (directory) for any particular words (keywords) used within a file or folder, the actual name of a file or folder with search results showing the exact location of each file or folder that contains those keyword search requests.
- Properties:
    - File:
        - Name: The name of the file.
        - Kind: What type of file that it is, such as a PDF or Text document, MP4 Movie file etc.
        - Location: This is the exact location of the file.
        - Modified: This is the date when the file was modified (changed).
        - Accessed: This is the date when the file was opened, but not changed; or changed.
        - Size: This is the size of the file in Kilobytes, Megabytes or Gigabytes.
    - Folder:
        - Folder properties are similar to *file properties*, however, they have extra security functionality, including ‘*permissions*.’

          Permissions are an <u>important</u> feature of computer, file, folder, smartphone or app security, because they permit (allow) or deny (do not allow) access to users or groups. Basically, permissions are split into (divided into) *Users* and *Groups*.
        - Groups have members. Members are *Users*.
        - You can grant access or deny access permissions for *Users* or *Groups*.
        - If a User is a member of a Group and the Group has permissions to access a file or folder, then ALL members (Users) of that particular group, can access those files and/or folders.

U-TECH 2023

12.3. How to use a standard touchpad (notebook/laptop)

Using the touchpad is exactly the same as using a wired or wireless mouse, except instead of using the body of the mouse to move the mouse pointer around to the user's desired position, you use your finger to move the mouse pointer by sliding it or dragging it around the rectangular area of the flat 2-dimensional touchpad area, inside the border of the touchpad (drag and lift your finger repeatedly, to where your want the mouse pointer to be).

12.4. How to use and '*get around*' (navigate) the computer

12.4.1. File Explorer (Navigation)

In every computer which uses a typical desktop file operating system, there is a file explorer. This feature allows the user or users to store, create, copy, move, delete (remove) and navigate throughout the file system. This hierarchical structure is the same as a physical filing cabinet, but in a virtual computing environment. It functions in the same manner: i.e. (that is), the main filing cabinet is the file explorer of the computer, then inside of the filing cabinet are sliding draws containing folders and then inside each folder are documents (also known as 'files').

12.4.2. Main Menu/Application/Programs/Accessories/Utilities/Settings

U-TECH 2023

Every GUI (graphical user interface) computer contains a main menu, from where you can access separate sub-menus, including: applications (also called apps or programs), accessories, utilities and settings.

1. Applications/Programs

This is where all of your apps (also known as applications or programs) are stored.

2. Accessories

Accessories are small programs/apps that perform important functions when you need to do certain tasks, such as write something quickly or use a calculator to '*crunch*' some numbers. Some examples of typical software accessories, include:

- Calculator: do all the calculations you need easily on your computer
- Character Map: useful for using all kinds/sorts of different keyboard characters.
- Notepad/Mousepad: useful for writing things quickly in a text document file (document.txt). Text files (.txt files) are compatible with virtually all computer software systems and can be read easily. They are the simplest form of a document and can be opened, read, written to and saved easily!
- Font manager: to select and arrange the fonts (text styles) that you want.
- Notes: similar to sticky note, this accessory allows you to write sticky notes on your computer, just like the paper type, digital.

- Screenshot: take a snapshot (picture/photo) of your screen using this handy accessory that you can save as different picture format types. For example a .jpeg or .gif photo file.
- Task manager: stop and start running apps as well as monitor running tasks currently in operation by the computer. You can view the amount of processor use that each app is using as a total percentage of the processor's performance ability/capacity (e.g. 1% processor power useage)

3. Utilities

In utilities, you will find a list of utilities (mini software programs) that can perform system and device tasks and display information and data about your device. Backups and Restore may be in this section.

4. Settings

This is where you alter your system settings, *so be careful*!

12.5. How to change settings in the computer

When you make changes to your computer hardware and software, you are entering the zone of '*you are on your own,*' so to speak. Making changes or altering the system is a risky activity, because of the risk of damaging something and not being able to reverse the situation.

U-TECH 2023

Therefore, the general pubic tend to hire computer technicians to peform the task of configuring technological devices. All of the options are available for the user to change almost everything to do with your computer. Networking, connecting, watching visually or listening phonetically using audio, printing etc. - your machine can be useful for so many things. At first, fax machines were popular, then ISDN, then dial-up modem, then cable, fibre-optic and now high speed mobile and satellite connections as well as a more secure WiFI, with faster speeds.

12.5.1. Changing the desktop

The desktop comes under the modern setting name of 'Appearance.' It kind of makes sense as a new and modern name, because people know what appearance means – it means, what something looks like, hence the name Appearance. In there, you change almost anything that is visually built-in to the system desktop. Font size, Folder size and arrangement, Menus, Colours, Layouts and Designs (Themes), Change Desktop Background Picture, etc.

13. The Internet

Invented during the 1960's in North America and first used by the U.S. Military, the internet has driven technology throughout the world as the first major breakthrough in digital communications since satellite T.V. (television).

Its expansion has spread across the globe, reaching virtually most areas of the populated world.

Speed in the beginning was very slow, but accelerated as connection speeds increased which greatly sped up all online activities across all devices.

The internet can be thought of as a set of nodes that are all connected together, where each node is a computer or device on the internet network.

IANA (Internet Assigned Number Authority) control and administer domain names in North America.

This means that every domain name is registered through them via their country registrar if they have a state owned service, otherwise all registration control is overseen by IANA.

13.1. Administration

The internet began in the United States of America including the domain name service (DNS) and associated protocols.

Many people hire a business to do all of their internet work for them, because in some instances, it requires technical skills. On average, many people may not have the expected skill level to accomplish the task of going online for personal or business purposes.

Having a website or app running full-time may become costly, depending on your budget. Maintaining a website, email account or app can be quite time-consuming as well as costly, for the owner.

U-TECH 2023

Ownership is governed in this order:

1. IANA USA,
2. Your local country's state authority

13.2. Domain Names

Domain names were originally any website name such as www.example.com which demanded a yearly fee, passed onto your local country domain name authority where you can choose, select and pay for your desired domain name e.g. www.mywebsite.com.

Ownership is governed in this order:

1. IANA
2. Your local country's state authority

13.3. Websites

www, also known as the '*world-wide-web*,' is the prefix to the actual domain name mywebsite.com for use on the web server, however aliases began to be used – basically removing the www from

www.mywebsite.com to only require mywebsite.com to be typed into the internet browser's address bar field. So instead of typing in www.google.com, we only need to type in google.com and press the Enter key on your device.

13.4. Internet Browsers

Internet or web browsers (as they were originally called), are what you need to view web pages such as mywebsite.com. It is a graphical interface for you to view a web page online and downloads words, documents, pictures and videos for you to look at locally on your desktop computer, tablet or smartphone. Any web site such as youtube.com streams compressed videos to your device using either a browser or an app. Traditionally, internet browsers were how you viewed multi-media content on the internet. Some of that media includes text (letters with different fonts), pictures (images) and videos. Of course the speed of streaming has increased and as a result higher definition videos have evolved into high-speed and high-quality streamed video whether it's downloadable or not (only streamed – downloaded in parts as custom file types, which may not be easily viewable or joined together to be watched later).

13.4.1. Menus

A typical menu would contain a list of selection options or features including: new tab, new window, new private window, history, downloads, bookmarks, zoom, print, find, edit, settings, help and exit. Let's go over these options to explain what they are and what they do.

U-TECH 2023

1. New Tab

A tab is a window within a window – this means that you can switch/swap/tab across to a new child window pane within the main parent window quickly-it's as if you can flick quickly between websites in a single window (multiple windows within one window). Tabs are a relatively new addition to internet browsers and browsing. Prior to this, people had a stack of windows open and it was easy to get lost in navigation of where you were or wanted to be!

The introduction of tabs gave users a quick and neat browsing experience on the internet.

It is certainly a very useful feature of modern browsers.

2. New Window

A *window* is similar to that of a window on your computer, smartphone or tablet in that it is the main container used for viewing content within the program, software or app.

Windows were created first and *tabs* second, along the timeline of browser development.

Prior to the *New Tab* feature, there was only the *New Window option*, which meant that users would create a pile, stack or layer of browser windows, within the program.

3. New Private Window

The internet got flooded with browser tracker files such as cookies that allowed a website to record certain information according to local guidelines from your internet browser browsing session.

Cookies

Cookies are used to store data for the website session or according to the browser settings - that is, users can change the cookie settings in the *Settings* section in the File menu of the browser.

Cookies can record and transmit:

- Your name, address, country, telephone number, email addresses
- Your IP Address
- The time and date of logging on to their websites
- Activity on their websites (actions such as page navigation, downloads and uploads)

4. History

This is basically a list of all the URL's and website pages that you have visited in chronological order for fast referencing. They are listed in time or date order.

5. Downloads (folder)

Most browsers have a *Downloads* menu option which is usually a direct link to your computer, smartphone or tablet's Downloads folder on your device.

U-TECH 2023

6. Bookmarks (folder)

The bookmarks folder is usually stored in a location inside the main application's folder, such as Chrome, Firefox or Opera etc. You may have to search your system or disk to find the location of this folder. This is useful for when you want to export or import all or some of your bookmarks.

7. Zoom

To zoom in or out of any tab, window or page, simply hold down the 'Shift + Ctrl' keys and then press either '+' to zoom in (make it bigger) or press '-' to zoom out (make it smaller).

8. Print

To print any tab, window or page, simply press the 'Ctrl + P' keys on your keyboard to print the document using a printer or to save it as a PDF document file format (e.g. fileA.pdf).

9. Find

To find any words within a tab, window or page, simply press the 'Ctrl + F' keys to search for words.

10. Edit

Cut, Copy and Paste are the 3 editing functions.

To copy any highlighted (selected) text, file or folder, simply press the 'Ctrl + C' keys to copy the selection(s).

To paste any highlighted (selected) text, file or folder, simply press the 'Ctrl + V' keys to paste the selection(s).

To cut any highlighted (selected) text, file or folder, simply press the 'Ctrl + X' keys to cut (remove temporarily – send to the clipboard) the selection(s).

11. Settings

In the settings sub-menu, there are many options to control and manage your browser.
This includes: your passwords, usernames, cached temporary files, cookies, auto-fill data and layout/design settings such as font type, font size, ad blocking, language, time zone or region etc..

In Settings, you can empty your cache – which may fix some problems with websites not loading correctly or plugins and extensions which are not working correctly. This may be called ‘Clear browsing data,’ or ‘Clearing the cache.’

Privacy and security settings can be manipulated in here. There are also extensions, add-ons and plugins. All of these things help you obtain extra features and multimedia (audio and video) capabilities to have a richer and more interactive experience for the user.

U-TECH 2023

12. Help

Most software/apps/programs tell you about the version number in the help menu. Go to Help/About "App Example" and there it will tell you the version number of the app/program/software that you have installed on your device.

13. Exit

If you press '*Exit*,' the browser program will close.

13.4.2. HTML

Hyper Text Markup Language, known as HTML, was the invention of the internet language that made web pages visible to the human eye. HTML is a software language used in internet web browsers or ‘browsers’ and servers to display mixed content, link sites, email, receive information in forms submitted and work with plugins and extensions to provide a highly enjoyable user experience for the person browsing the ‘net (internet) in a browser on their device.

HTML was first developed by Professor Tim Berners-Lee around 1991. HTML was to develop into HTML5, as it is today. Probably the most valuable feature is the new support of audio and video files - they can now be embedded by using the code in the HTML to embed the file, so that users can listen to audio and watch videos in any web browser.

Smartphones have internet browsers, however most people use apps-which use a different language to HTML.

1. HTML5

HTML5 brought a new platform which could play audio and video. This was a game-changer for HTML and user interaction. People can hear and watch sound and video files in any modern browser that supports HTML5.

Supported Audio Formats

- mp3
- ogg
- wav

Supported Video Formats

- mp4
- webm
- ogg

13.4.3. Cascading Style Sheets (CSS)

U-TECH 2023

Websites are usually made of HTML and CSS, which enables webpages to display content that is visually appealing, rich full of features. CSS allows for formatting of text within a webpage using HTML. It uses a *style*, which can be edited (changed) to alter properties such as font type, font size, font alignment, background colours etc. It really acts a a template for how text and colours appear on a webpage or website, much the same as a Document Editor, such as LibreOffice Writer.

13.4.4. Plugins

Plugins were part of the evolution of modern browsers, after HTML.

Early plugins included Macromedia's Flash and Shockwave Flash back in the 1990's.

Adobe's PDF (Portable Document Format) viewer plugin emerged for internet browsers, produced by Adobe. This plugin is used to open and view .pdf files within a browser tab or window.

Plugins became popular with multimedia software companies who developed such products.

HTML5 changed the requirement for use of a plugin, as it supports all modern multimedia formats.

13.4.5. Extensions

Extensions were the next phase or stage in browser development before the introduction of HTML5. They are more like an individual piece of software within the browser itself.

Software developers took advantage of the extension market for browsers and now there are extension stores, much like there are app stores. You can access the extension stores within browsers, by often going to: Settings/Extensions and then access the extension store that way.

13.5. IP Addresses

The IP address is either a 32-bit version, which is four (4) x sets of numbers, separated by a dot (.)
For example: 192.168.1.0
The number range for each set contained by a decimal point, is 0-255 (256 numbers). This is called IPv4 (Internet Protocol version 4).
The new IPv6 (Internet Protocol version 6) uses a 128-Bit address, making it very expandable. IPv6 has many more times the amount of addresses available.
An example of an IPv6 address is **2001:db8::8a2e:370:7334**

The total number of IPv6 addresses possible is 2^{128} which is 340 trillion trillion trillion IP addresses!

13.6. Symbols and Characters used

Possibly the most commonly used character since the invent of the internet, is the '@' symbol, (pronounced /*at*/) used in every email, yet the hash-tag symbol '#' is widely used in social media these days across several big platforms such as YouTube, Facebook, Twitter and others.

Symbols and special characters play a big role in accessing sites, services or features in 2023.

U-TECH 2023

13.7. Protocols and Ports

The internet can be seen as a multitude of protocols and ports, in a nutshell.

But it can become very complex and knowledge of configuring such intricate systems can be a daunting task even at the best of times.

A protocol is a type of code in the software that *connects* to machines and devices that use the same protocol. Some examples include: http, https, smtp, pop3 and ftp.

A port is like a tunnel with a number in the range of 0-65,535 ports. Protocols can use ports to connect out to a WAN such as the internet.

13.7.1. HTTP

Hyper Text Transfer Protocol was developed in 1989 by Tim Berners-Lee.

Each web browser contains the http and the https protocol to enable connection to a website for browsing it.

This is the standard protocol for using the internet that every internet browser contains – the basic http protocol. A URL (Universal Resource Locator) is any webpage address location, such as: https://www.wikipedia.org/ or any other page location within a domain name website.
For example (e.g.), https://en.wikipedia.org/wiki/Medicine

This webpage is contained within a website, with a URL or https://en.wikipedia.org/wiki/Medicine.

So, in other words, each website has webpages with unique locations, or separate URL's.

13.7.2. HTTPS

Hyper Text Transfer Protocol Secure was developed for encrypted connections to scramble the data which transfers between two (2) devices, allowing for safe data transfer, such as for banking online.

HTTPS uses TLS or SSL to secure a browser connection between two devices over the internet or network.

HTTPS uses port 443

https://website.com would use the secure https protocol with port 443.

13.7.3. URL

A Universal Resource Locator, is any website page's address location.

A typical URL would look something like this:

http://www.example.com/page1.html

13.7.4. TCP

U-TECH 2023

(Transmission Control Protocol) is the software technology which connects websites to websites. It is the most commonly used type of data connection and transfer today. Each time you connect or open a website, the TCP utility built into the network settings in your computer, transfers data (pictures and words etc.) to your device (computer, tablet or smartphone).

TCP and UDP are the types of Internet Protocol that can be used to transfer data over the internet.

13.7.5. UDP

UDP (User Datagram Protocol) is used for data transfer more than web browsing such as TCP.
It is used for fast data transfers such as large file downloads.

- IP (Internet Protocol) is the software technology that connects you to the internet. It is used to transmit packets of data from one connected machine to another connected machine on the internet and also acts as an addressing service for connected machines (devices) on the world-wide-web or internet network (the internet).

- IP Address: an Internet Protocol address is a set of numbers and letters that identifies your internet connection on the global network. It is one system, with each device having its own unique address. Hiding your IP address using a VPN, private browser and other tunneling techniques can hide your address or create a different address which prevents tracking and secures privacy to a limited degree.

13.7.6. FTP

File Transfer Protocol was created by Abhay Bhushan and introduced for use on the internet in 1971. It allowed for uploading and downloading of files and folders over the internet using its own separate protocol channel with user access to folders and files, which are able to be locked using an authorised username and password. Ftp client software became a popular means of transferring data over the internet, securely using a username and password, with security protocols and variants, ensuring a secure connection and transfer of information online.

13.7.7. FTPS

File Transfer Protocol Secure was created by using SSL technology. FTPS servers and client software used SSL to secure the connection and make the transfer of information using encryption technology.

13.7.8. POP3

Post Office Protocol v3.0 has been around a long time and is still the main technology used for receiving emails across the world. You can configure your email client software settings for accounts: incoming POP3 servers to match your hosting domain. E.g. pop3.mymail.com on port 110.

U-TECH 2023

13.7.9. SMTP

Simple Mail Transfer Protocol First developed at some stage during the 1960's, is still also the number one mail sending protocol today. Currently there are 333.2 billion emails sent per day across the world. That is a lot!

You can configure your email client software settings for accounts: outgoing SMTP servers to match your hosting domain. E.g. smtp.mymail.com on port 25.

13.7.10. SSH

Secure Shell protocol is used to transfer files and folders across the internet from a SSH client to a remote login SSH server. It operates using a key authentication system.

13.7.11. SSL

Secure Sockets Layer was invented by Netscape Communications. It used digital certificates to authenticate and encrypt the connection securely between two (2) devices using an internet browser over the internet. SSL went to version 3.0 before being replaced by TLS.

13.7.12. TLS

Transport Layer Security was created in 1999 as the new and more secure version of SSL. The current version is 1.3 as of 2023. It offers stronger encryption security and sophistication using a pseudo-random master password utility.

13.7.13. Encryption

Encryption is the process of using the science of cryptography to ‘hide’ or ‘code aka encode’ data so that it is unreadable to any user or device which does not have one of the keys. Two (2) keys are required to encrypt and decrypt (decode) the data over the internet or network.

1. DES

Encrypted keys began back in 1977 at IBM, when they released the first data cryptography encryption key system called Data Encryption Standard (DES). It was 56-bit encryption standard.

2. AES

The next standard to be released was AES (Advanced Encryption Standard) in 2001 by the U.S. National Institute of Standards and Technology and delivered 128, 192 and 256-bit key sizes.

3. RSA

Rivest-Shamir-Adleman is a cryptographic system that contains a public encrypted key and private decryption key. It was developed in 1977 by Ron Rivest, Adi Shamir and Leonard Adleman.

Following AES, came RSA which is still in use today. RSA has up to a 2048-bit key size, making it virtually uncrackable. To ‘crack’ a code, is to decrypt it, which means that you can read and copy the data.

U-TECH 2023

13.7.14. VPN

A Virtual Private Network is a relatively secure way of using the internet to avoid intrusion, monitoring or data theft. If used with secure tunneling protocols, your internet connection will be virtually unreadable by anyone between your device and the website or online device that you are visiting, as well as links that you browse. In other words by using a VPN and secure tunneling, nobody can detect what you are doing online (unless you use a paid VPN subscription service, in which case, the staff can view your browsing sites and traffic, making it extremely valuable for privacy and avoiding online attacks with infections or destructive actions to your device(s).

13.7.15. VoIP

VoIP (Voice over Internet Protocol) is a modern internet telephone, whereby a LAN ethernet cable from a WiFi modem router is plugged into an ethernet port at the back of the VoIP phone to allow you to make normal phone calls locally or internationally through a VoIP service provider. This allows for cheap phone calls over the internet.

13.7.16. Web Portal

A web portal is simply a website login page that gives users access to information such as company intranet information locally, or data remotely. This is very convenient for employees or organisations who can access information from data stored in local or remote databases stored locally or remotely or for users in community forums and open-source online communities who

exchange information freely within the group online for registered users to access through the web portal.

Companies, governments and organisations benefit from using web portals, because it means that staff or users can securely access information from within an internet browser anywhere with an internet connection.

13.8. Security and Privacy

13.8.1. Security

Security refers to the protection of your device and your data.

Computers undergo vicious attacks that can either cause you great pain in terms of potentially costing money and time, as well as being an inconvenience, which you don't really need.

Recommendations are to have a firewall installed and operating such as in an Internet Security software package for your type of operating system. Some popular programs available for various popular (commercial) operating systems have the downloads available from their website.
Some of these include: kaspersky.com, 360totalsecurity.com, avg.com, eset.com, avast.com, norton.com, comodo.com and avira.com, These packages combine detection, removal of viruses and repair of infected files on your device, to keep you protected as well as (if possible), clean/repair/fix any corrupted or infected files in your system. Usually these anti-virus applications come in the form of a monthly or yearly subscription. Windows computers are the most vulnerable to computer virus infection, because of how widespread this commercial OS is across the world today. Apple computers are somewhat at risk to security and privacy breaches. Linux computer operating systems are the least vulnerable to malicious attacks and infections of the three (3) systems.

U-TECH 2023

1. Firewall

Yes, it is most important that you install a firewall on your machine, to block any incoming connections from outside of your local network (LAN) and allow outgoing connections from your device and LAN to the internet outside (WAN).

Defending your device is essential to ensure a clean and fully functioning computer, tablet or phone.

Keeping unwanted access to your device, will protect it from 'sniffing,' malicious or destructive activities, and data theft.

Ports

There are 65,536 ports available in a network connection (ports 0-65535), and choosing the ports you want open or closed, is important to fully understand how to use a firewall. Port '0' is reserved by your OS for IP address functionality.

Action	Result

ALLOW (permit) incoming connections	permit incoming connections from a device on the internet or network to YOUR device (not recommended and potentially dangerous)
DENY (block) incoming connections	incoming connections are NOT permitted, with no response to the attempting connecting device. This means that all ports from 0 - 65535 are BLOCKED from connecting to your device from the internet or a network.
REJECT (block) incoming connections	incoming connections are NOT permitted, with a response from your device to the attempting connecting device, advising to it that it has been rejected (not allowed {not permitted})
ALLOW (permit) outgoing connections	permit outgoing connections from YOUR device to another device on the internet or network (this option still has risks of devices transferring data via your browser or other software to the external {outside} device, hence acting as a security risk)
DENY OUTGOING ports 1 - 79; DENY OUTGOING ports 81 - 442; DENY OUTGOING ports 444 - 65535	Do not allow (do not permit) ports 1 -79 to be open OUTSIDE; Do not allow (do not permit) ports 81- 442 to be open OUTSIDE Do not allow (do not permit) ports 444 – 65535 to be open OUTSIDE; Ports 80 and 443 are the most commonly used ports needed for a device. Port 80 is a web browser connection port required by many websites and the more popular and secure port required by many websites is port 443 – the Secure connection port. Most email can be accessed in a web browser using port 443, with no other ports required to be open (such as gmail.com, outlook.com, yahoo.com), however some home or business users use a desktop client. In this case, you will need to allow port 25 to send emails (SMTP protocol) and port 110 to receive emails (POP3 protocol).

U-TECH 2023

Incoming Connections

Generally speaking, you want to ***BLOCK all incoming connections*** to your device, to protect it from online attack(s). BLOCK may also be referred to as REJECT or DENY (see the table above).

Some software, such as business or gaming software, may require you to OPEN an INCOMING port, in order to allow the external server or device to talk to your client (locally installed) software or app.

Outgoing Connections

Generally speaking, you want to ALLOW outgoing connections to your device but only allow the ports out that you need to use, to protect it from online attack(s), device destruction or data theft (see the table above for how to setup OUTGOING connections, securely).

13.8.2. Privacy

The internet has brought society great joy through networking and communications – in particular, with family and friends. People continue to advance through their lives using the internet, but it comes at a cost or price, because to stay safe and secure, it costs resources which are usually time and/or money. Defending your valuables online is an important issue, because it can be compromised if the person either has changed something or the computer was never set up correctly from purchase to defend against attacks, theft, damage and destruction.

This section is divided into: internet connections, detection, repair and/or removal of viruses and monitoring for any potential attacks in the future.

U-TECH 2023

It is important to clear your internet cache, history, cookies and other files regularly and is recommended to be completed often, in order to maintain a fast operating browser application with less chances of a slowly operating computer. The more 'junk' files that you store in your internet browser or operating system, the slower your machine will be. Also, be aware that the more applications that you have installed, the slower the computer will operate at.

13.9. Building a Website

Making a website these days can be done in three (3) ways:

1. Online using pre-made templates from a website seller and may offer the option of buying your own domain name (such as mywebsite.com), email addresses, security certificates for secure e-commerce websites;
2. Make your own website using a template from the thousands available online for sale. There are many website template styles out there today, such as Wordpress, Joomla, etc.; or
3. Write your own HTML code in a document editor.

E-commerce websites involve more design, layout and interactivity than just a simple website such as a blog or company website providing information, mostly in the form of text and images.

E-commerce websites are online shops, that sell physical or digital goods and/or services from a website. Therefore, they use credit card payment processing services, incorporated into the site, from a 3rd-party company.

The things you will need to make your own website:

1. A domain name, which is paid to a Domain Name Registrar company every 1, 2, 5 or 10 years.
2. A hosting https web server or service that leases you space to store your website on a monthly or yearly basis.
3. An Email server or service where you store your email addresses and administer them.
4. For e-commerce, you will need a credit card payment gateway service and a TLS (SSL) secure certificate to use the https protocol to securely connect and communicate when using your website.

13.9.1. Content Management System (CMS)

U-TECH 2023

Content management systems are websites, specially designed for managing information such as text, images and videos on a website. The most popular CMS's are those written using the PHP computer scripting language. PHP is a server scripting language, which provides dynamic content. The most popular PHP CMS's include : Drupal, Joomla and Wordpress. These are all CMS's which use the file extension .PHP for active dynamic content.

13.10. QR Codes

QR codes (Quick Response codes) are the new way to scan objects for sending and receiving payments, sending website links or transferring data in some other secretive way. Each QR code is unique, that is to say – they are all different, like telephone numbers. They are similar to barcodes, used on product item labels, to identify each product uniquely (solely) that is matched up to a product description and price, stored on a computer system.

QR codes are the new modern style of barcode – they can be used to do many things including: shopping, downloading apps or opening websites.

13.11. Cryptocurrencies

Cryptocurrencies are digital currencies, or digital money.

Digital money has been around since the 1980’s, however it was the digital currency called Bitcoin, that really took off and became popular instantly around the world. Bitcooin, or BTC as it is officially known as in the banking and financial sector industries, was created by a Japanese man in 2009. Today there are BTC ATM’s (Automatic Teller Machines) and people trade online using

Bitcoin everyday over the internet. You can use Bitcoin to purchase things online or trade in Bitcoin, the same as official national currencies such as the Chinese Yuan, Russian Rubles or Australian Dollars.

13.12. Email

13.12.1. Types

There are basically two (2) types of email:

1. Client email: this is where you install a program or app onto your device and configure it manually (or automatically) to login to your email server which allows you to send and receive emails. Configuring the client software sets up an email account on your device (computer, tablet or phone). Ports must be set correctly, i.e. the Incoming (receiving) POP3 Port must be set to Port 110 and the Outgoing (sending) SMTP Port must be set to Port 25. These are both unencrypted ports. POP3 has an encrypted port: Port 995 (if your server has this functionality).
2. Webmail: This is where a user can access their email online using a web browser. It uses TLS or SSL technologies (basically digital certificates, which you can also make yourself free). So, the concept is that you open a web browser and then type in the domain name of your email server hostname into the address bar of your browser with a ‘mail’ prefix.. For example: mail.mydomain.com
This will then present you with a new login screen with the fields: Username and Password. Of coarse, this page is encrypted using security certificates. Enter your details, to access your online email account.

U-TECH 2023

13.12.2. Composing an email (How to make an email)

There are several fields in an email and understanding what they are, how to use them and what they stand for are all important to fully understand which features that you may have in your email account, whether online in a web browser or accessing your email through a client.

1. To: field

This is who the email is going to. This is where you enter the person’s, company’s or server email address(es) into this field. For example: JohnnyX@email.com

2. Cc: field

Cc stand for Carbon Copy. Here you can enter the email address(es) to send them a copy of the email and/or attachments also.

3. Bcc: field

Bcc means *Blind Carbon Copy*.

4. Insert Attachment

The paperclip symbol is how/where you attach a file to your email(s). Select Insert/Attachment/Files from your computer then navigate to where the images, pictures, videos or documents are and press the button, ‘Select’ or ‘Upload.’

5. Send an email

To send an email, first check that it is all complete and ready to send, especially if you need to or have to send an attachment with the email. When you think you are ready, **press the Send button**.

14. Networking and Communications

Since the first discovery of connecting computers, networks have expanded in size and capability, considerably. In particular, networking speeds have increased dramatically, such that streaming internet data for many devices at high-speeds, is now possible. 30 years ago, this wasn't the case.

Transmitter and receiver hardware has grown exponentially, such that there are virtually no limitations in transfer speeds, including new wireless technologies which can transfer data at 2.5 terabits per second.

U-TECH 2023

14.1. Networking

14.1.1. WAN and LAN

There are two (2) types of networks:

1. WAN: Wide Area Network
2. LAN: Local Area Network

Wide Area Networks are large or global networks such as an organisation or the internet.

Local Area Networks are smaller, ‘in-house’ or localised networks, such as inside an office or at home. Routers at your home or office, typically contain a LAN, with IP addresses allocated to the client who connects to the network via authentication and/or administration.

1. WAN

A WAN is called a Wide Area Network. WAN’s can be a company’s network of LAN’s throughout five (5) cities across the country, as an example. The whole wide connection of each city’s office makes it a WAN. The internet itself is an example of a WAN.

2. LAN

A LAN is called a Local Area Network, usually administered at a central point such as your home WiFi modem router using a web browser to access the router and administer network access for devices on to the LAN. A LAN can also be created and administered on a server to allow users to access the local network. LAN’s can connect to other LAN’s over an internet connection.

14.1.2. Internet

The internet is one big wide area network and allows users to 'network' or connect to resources in storage and to access services online that are accessible using the internet. Server technology and standalone devices such as firewall rack units and networking gear including modems and routers with wireless capabilities. Secure connection methodologies make connecting more secure and permits private connections remotely over physical distances.

1. VPN's & Secure Tunneling Technologies

Security matters! When using technology, the internet and networks, it is important to maintain some type of security. Any man-made object can be broken and such, so is live online information – it is breakable. In other words, using certain technologies can prevent you from any damage and avoid a situation that you do not want to be in. Damage can be in the form of time, money or resources and may be costly!

U-TECH 2023

So therefore, it is a topic which should be considered as something serious in the computing world.

VPN's are Virtual Private Networks and allow for point-to-point connections over public networks, usually using encryption. If you use a VPN , this will allow you to bypass restricted or blocked internet services and/or websites.

VPN's come in commercial and open-source versions, depending on what you require or can manage. Paid software has its benefits and its pitfalls. Ease-of-use is convenient for the average user, but the sacrifice is that you have to send to the VPN provider company, some type of identification, which means that you are not 100% invisible.

The commonly used VPN tunneling technologies are listed in this section.

SSH

SSH stands for Secure Shell. SSH is an encrypted tunnel using the SSH protocol for online use.

It works by an SSH client piece of software which connects to an SSH server, using the tunneling SSH protocol to establish a connection to an SSH server.

L2TP

Layers 2 Tunneling Protocol, or, L2TP is used in conjunction with IPSec layer 3 protocol to secure the network transmission of information.

IPSec

IPSec is Internet Protocol Security which uses encryption to encapsulate (encode or hide) the packet of data transmitted through the tunnel.

SSTP (HTTPS protocol)

Secure Socket Tunneling Protocol is a VPN tunnel that uses SSL (Secure Sockets Layer) authentication with keys, encryption and data checking.

SSL

SSL is the Secure Sockets Layer and uses certificates along with TCP port 443 to secure connections and was invented by Netscape Communications in 1995 as a public release into its internet browser, 'Netscape.'

TLS

TLS, or, Transport Layer Security, uses cryptography by implementing certificates and other algorithms to tighten security and ensure no data leaks occur. TLS also uses TCP port 443.

U-TECH 2023

14.1.3. Wi-Fi

Wi-Fi (also known as, 'Wireless Fidelity") is registered as a trademark to the Wi-Fi Alliance, who certify authentic Wi-Fi functionality with their official certificates. It is used across the world in coffee shops, hotels, homes, offices and airports.

Wi-Fi is everywhere. These days, home WiFi is becoming an affordable standard. High-speed cable and/or fibre internet is the backbone for the WiFi service. WiFi LAN speeds have dramatically increased, within the local WiFi network - allowing users to access the WiFi Modem Router, much quicker than before.

1. IEEE 802.11 A/B/G/N/AC

Wi-Fi is categorised according to which bands they use. All Wi-Fi connections, are a part of the IEEE 802.11 standard.

Name	Standard	Transfer speeds (Mbps = Megabits per second))	Radio Frequency (Ghz = Gigahertz)
Wi-Fi 7	802.11be	1376-46120	2.4/5/6
Wi-Fi 6E	802.11ax	574-9608	6
Wi-Fi 6	802.11ax	574-9608	2.4/5
Wi-Fi 5	802.11ac	433-6933	5
Wi-Fi 4	802.11n	72-600	2.4/5

Wi-Fi 3	802.11g	6-54	2.4
Wi-Fi 2	802.11a	6-54	5
Wi-Fi 1	802.11b	1-11	2.4
Wi-Fi 0	802.11	1-2	2.4

14.1.4. Bluetooth

Bluetooth is a modern wireless technology using specific frequencies. It can be used to connect to a host device and transmit audio, video and provide internet connectivity. This type of connection is also called '*Bluetooth tethering*,' which is categorised under '*Mobile Hotspot and Tethering*' on mobile phones. Within that section, you will see the two (2) options: *Bluetooth tethering* and *USB tethering*.

14.1.5. USB

Universal Serial Bus cables are hard-wired connections and can also provide internet connectivity. This is particularly useful for notebooks (laptops), tablets or iPads so that they can connect to your mobile phone for internet access. As explained above in Bluetooth tethering, the USB tethering option is in the same section in/on your mobile phone, under *Settings/Connections/Mobile Hotspot and Tethering.*

U-TECH 2023

14.1.6. Cables

1. Cat 5e - 100 MHz Speed and Performance Cabling for LAN's

Category 5a,b,c were the industry standard in high-speed LAN cabled network cabling systems of our time, in use from around the year 2000. They can transfer data at a rate of between 1-5 Gbps (Gigabits per second).

2. Cat 6a - 500 MHz Speed and Performance Cabling for LAN's

-100 metres in length capability and the new industry standard in fast networking. Cat 6 is faster and travels further in metres, than Category 5 series LAN networking cabling, used across offices, factories, governments and homes across the world. Category 6 ethernet cables can transfer data at a rate of 10 Gbps

3. Fibre Optic

Fibre optic cable transfers data at speeds of up to 100 Gbps.

4. RJ11 Telephone

RJ11 is an old standard in connectivity for telephones into socket walls and into the back of or underneath telephones. It contains 4 pins and is still the most common world-standard for telephone connections. Both telephone cables with a plug and telephones with a socket, use the RJ11 plug/socket connectivity standard.

5. RJ45 LAN

RJ45 is the standard for LAN connections using Cat 5e and Cat 6a cabling.

These connectors use 8 pin plug and jack connectors for LAN (ethernet) connections coupled with Cat 5e or Cat 6a cabling.

14.1.7. Modems

Modems normally connect to the internet via a standard telephone line and connector (RJ11).

14.1.8. Routers

A router is a device which allocates IP addresses to users who are logged into the LAN or WAN. They have developed over the years to become more than just an IP address allocation service device - they have become a kind of all-in-one device, offering a firewall, port configuration tool, hacker detection, time zones, filtering and more. Modern routers are quite function-packed devices and are getting more and more full of features as technology improves. Once upon a time, a router was a separate device to an ADSL internet modem, but nowadays the WiFi box, modem and router are a 3-in1 single device box. Times have changed quite dramatically and WiFi modem routers are now cheap, fast and secure.

U-TECH 2023

14.1.9. Hubs

A hub is a simple (or basic) version of a switch (see *Switches* below). A hub is a hardware device which has multiple RJ45 LAN Port sockets for computers to access a network such as a LAN. Hubs are used for computers to connect together usually with ethernet cables, within a LAN.

14.1.10. Switches

Switches are sophisticated hubs, able to transmit data across multiple networks and can manage IP connections (addresses) from connected networkable devices effectively and efficiently without dropouts or clashes on the network between devices, thereby allowing devices to stay connected to a network or networks (LAN or WAN) without connection problems. Therefore, switches are the preferred choice when selecting between a hub and a switch for a network, because they offer more network interoperability, flexibility and stability, allowing for better management of the network.

14.2. Communications

Communications have come a very long way since the 1800's. From telegraph wires to satellite internet dishes – the hardware or equipment used to communicate, has changed considerably.

Wired to wireless is the evolution of communications during the past 250 years. Yes, it has changed tremendously already, however it may still change a lot more, in the future.
Communication quality has greatly improved in terms of: graphic resolution density, speed of delivery and retrieval. These are defined by modern technology such as touchscreen, Bluetooth computer mice, keyboards, scanners and printers. So yes, communication infrastructure working

alongside the localised technologies and peripheral gadgets surrounding your desktop, notebook, tablet or smartphone allow people to communicate in a modern way.

Satellites, mobile phone towers, Wi-Fi, USB, ethernet, fax, email, microphones and speakers are all ways in which we communicate by interacting using technology.

Things can be achieved using technology in our modern times. Technology allows us to perform fast communication tasks.

With the ease of wireless and the robustness of wired, we are gradually changing towards a '*wireless world.*'

As Bluetooth sound systems become popular throughout the world, wireless microphones and speakers have emerged and are now widespread in 2023. This allows people to use wireless techniques to talk, chat, sing, play music, watch movies or download anything from the internet.

Communication Variables	Technology
Wireless such as ***Mobile*** or **Wi-Fi** 1. **Mobile Phone** 2. **Wi-Fi**	Uses Radio Frequency (RF) 1. ***2G, 3G, 4G***: 0.2-2.7 GHz; ***5G***: 3.3-4.2 GHz 2. **2.4** GHz and **5** GHz
Satellite Radio Frequency 1. Mobile Phone 2. GPS	1. **Mobile Phone**: Radio Frequencies are 626.5 to 1660.5 MHz for the transmitter and 1525.0 to 1559.0 MHz for the receiver. 2. **GPS**: • L1 Band: 1575.42 MHz with a 15.345 MHz bandwidth • L2 Band: 1227.6 MHz with an 11 MHz bandwidth • L5 Band: 1176.45 MHz with a 12.5 MHz bandwidth
WAN (Wide Area Network) – the internet outside	Optic fibre cable, telephone line cable and radio frequency using mobile phone tower transmitters and receivers
LAN – your home or office WiFi Router	The 2 radio frequencies used for WiFi are the 2.4 GHz and 5 GHz bands (as above)
Input method – touchscreen, keyboard or microphone (mic)	3.5 mm Jack Socket Audio In/Out
Bluetooth – headsets, conferencing speakers and entertainment systems (speakers, guitars etc.)	Radio Frequency 2.45 GHz

U-TECH 2023

15. Fixing Problems and Repairs

15.1. Software (OS's, Apps and Programs)

There is good news, you can fix it yourself! U-TECH 2023 explains for you, how to repair your computer from a corrupted filesystem, a virus attack, intrusion attack or malfunctioning OS such as Windows, MacOSX, Linux and Android or iOS smartphones and tablets.

This can be a frightening situation to be in, because the first reaction most people have is to panic and then potentially put the machine at even more risk of harm, by rushing into actions which may compromise your computer or other device, even more.

Knowing what to do in a situation like this can be extremely difficult to manage, because it requires skills which enable the computer to be repaired to its original state, with files/documents/data unharmed.

Files, documents, pictures, photos, videos, movies and other items on your computer may be very important and irreplaceable, so it's no surprise that people become very upset if there is a problem accessing them. Taking the correct steps in the correct order, ensure that the highest possible effort has been exerted to detect and remove malicious or unauthorised items on your computer, but also to block any further attempts to intrude and tamper or interfere with your privacy.

Common ways of becoming infected with malicious content includes: apps, programs and website clicks. Malware (malicious software) can steal information or destroy your computer so that it is inoperable and must be overwritten with a new OS.

U-TECH 2023

15.2. Computers and Notebooks (Windows, Mac OSX and Linux)

There are a number of steps to take in order to determine (troubleshoot) what is causing the software malfunction. IF YOU CAN, make a copy (backup) of your documents, pictures, music and videos etc. to an external drive BEFORE doing anything. *If you cannot do this or have never made a copy of your files and you are worried that a reinstall of the OS option on some OS's may not permit (allow) for your files to be untouched (not deleted or erased – that is, they will be deleted/erased), then you can try using recovery software by attaching your infected or broken OS from your deice drive to another OS using a USB cable, which is working, to view and copy your files to a safe location which you can then transfer back (copy back) to your original computer, once the drive has been formatted and the OS reinstalled to be working as normal how it used to be before.*

Try these steps in this order to remove the malware and/or repair the computer.

1. Try uninstalling/removing any software which was recently installed that you may be suspicious of that could be potentially causing the problem(s).
2. Try using recovery options built-in to your manufacturers image of your disk from when you bought it. Note: some manufacturers of computers have reserved a certain volume or section of your hard drive or SSD to reinstall the OS to its original condition, however there

may be two (2) options: - *1) reinstall a new OS over the top of your current infected OS, leaving your documents and files all in place as they were; or 2) install a new OS on your drive, which erases all of your data including your files such as documents, pictures, music and videos.* ***[CAUTION]: MAKE SURE TO BACKUP ALL OF YOUR DOCUMENTS, PICTURES, MUSIC AND VIDEOS BEFORE YOU REINSTALL THE OPERATING SYSTEM OR WIPE (ERASE - DELETE) THE HD (HARD DRIVE), SSD (SOLID STATE DRIVE) OR USB EXTERNAL DRIVE.***

This process is known as formatting the drive or 'wiping the drive,' which ultimately means erasing/deleting the contents of the hard drive inside the computer.

The operating system is then installed, followed by any applications you wish to use.

Again, malfunctioning or dead hardware and software, can either be fixed or replaced. The first option of fixing hardware is usually much cheaper than the second option of replacing, which is normally more expensive.

15.3. Android Smartphones and Tablets; iPhones and iPads

These days, online backups are commonly used to copy the folders, files and even settings from your device up into '*the cloud*' (a storage server online at a remote location). Google, Apple and other manufacturers provide this facility to help keep a copy of a user's data, in case of emergency.

U-TECH 2023

Sometimes, we may need to empty or clear the Android OS system memory files which are stored inside your phone's memory, as well as an app's cache. To clear the memory, go to:

Settings> Device Care> Memory and then press the '*Clean now*' button, to clear the memory files stored in your system.

To clear the cache of an app, press and hold down your finger on an app's icon. You will then see 4 menu options: 1) Select items; 2) Remove from Home (this only removes it from one of your Home screens but does not uninstall the app from your phone.); 3) Uninstall (this does uninstall or remove the app from your phone.); and 4) App info. Press '*App info,*' then select 'Storage' and then at the bottom of the screen you will see two (2) buttons: 1) Clear data (this will remove all of your account information or any progress in an app such as a game, so **BE CAREFUL** to only press this, if you are wishing or intending to remove everything about the app.); and 2) Clear cache. Press this button – '*Clear cache*'. This will only remove temporary files, but *will not* interfere with any account or progress made or obtained with that particular app. Clearing the cache may fix some problems which you could encounter when using any app on a smartphone. The same applies to Apple iPhones and iPads.

iPhones and iPads are similar, just the same as Android smartphones and tablets are similar – i.e., they use the same operating system and app design structure. So, iPhones and iPads use iOS; and Android smartphones and tablets use Android OS.

15.3.1. Android Smartphones and Tablets

Smartphones and tablets can be reset to their factory settings (***WHICH WILL WIPE ALL DATA AND RETURN THE PHONE TO HOW IT WAS WHEN IT WAS IN THE SHOP **<CAUTION>***). If you cannot get your files that you need off the device, plug it into a computer using the USB cable, open the smartphone or tablet, then locate the 'DCIM' folder. All of your photos, videos, audio and data are stored in that folder. Copy the contents of this folder, to your computer. You can then reset the phone or tablet to its original state. If you are unable to find this folder or any of your files, they may have been deleted or moved, in which case, you should search the Google Play Store for an app to find, recover or dig up deleted files. If you cannot use your smartphone or tablet, you can try doing the same thing on a computer/notebook, by searching online for a program or an app to search for (find) or recover files from a hard drive/disk drive. After you install such software, you can run it and then select your smartphone or tablet as the hard drive, which you want to recover data from. The USB cable obviously needs to be attached to the computer or notebook, so that it can see and access your smartphone or tablet.

A simple and easy way to find and copy your files are to use an SD or MicroSD card, which many Android phones and tablets have. You can then copy them across to your computer or tablet, reset your smartphone or tablet back to its factory settings and then insert the SD or MicroSD card back into your phone and copy your files back onto your smartphone or tablet.

If you are still unable to find, recover or copy your files, you should seek technical advice from a technician.

U-TECH 2023

Android phones and tablets can be reset to their original condition, by:

1. Turning off the phone.
2. Holding down the Volume Up, Volume Down and Power ON/OFF buttons (3 buttons together) all at the same time, using 3 fingers and wait until the green Android robot appears on the screen. You are then presented with a terminal command line set of options. Use the Volume Up and Volume Down keys to navigate to the option "***RESET/RESTORE DEVICE TO FACTORY/ORIGINAL SETTINGS***.'
3. It will take up to about 30 minutes to reset your phone to its original state.

15.3.2. iPhones and iPads

Apple's recovery system, is different to Android's, in that resetting/restoring these devices back to their original factory setings, must be done by connecting a Macintosh computer or a computer running iTunes on it, to the iPhone or iPad using a USB cable to connect the two (2) together. See Apple.com for further details on how to recover or reset your system, including lost passcodes/passwords for your AppleID account. See this article here - https://support.apple.com/en-us/HT211078

15.4. Hardware

Hardware that is malfunctioning, not working properly or appears broken may come as a shock for some people, who never expected for a physical part or component that is broken and doesn't work.

Most man-made appliances or objects can and usually do break, need replacing or repair(s).

Any moving parts or parts that get hot are in the highest risk category that are likely to eventually over time or in a high-risk environment (hot rooms, dusty rooms, insect or pest infected areas), break! Most commonly, hard disk drives (HDD's) which contain high-speed moving parts. HDD's have a disk which spins at very high speeds, so naturally there will be 'wear and tear.'

Next on the list are DVD drives. Their lens attached to the slot tray inside can become dirty and may require a clean with a soft cloth. The drive casing may have become unlocked from a notebook and you can pull it out. This could be caused by a missing screw or unlocked switch sliding button underneath the notebook.

15.4.1. Disk Drives, Hard Disks and SSD's

Hard drives can be removed from desktop and notebook computers or tablet devices. This is called '*removable*.' Media is commonly referred to as removable, such as, *"… a removable USB drive."*

To remove a drive, unscrew the aligned plastic panel from the back of your notebook or tablet.

A tower or mini tower will have removable HDD's or SDD's, allowing them to be replaced, serviced or installed new.

U-TECH 2023

15.4.2. DVD Drives (Burners)

DVD drives, like DVD discs, have advanced over the years, superseding CD Drives and have developed into compact, thinly shaped removable (slotable) device players that universally fit into 2 main sizes: 1) desktop/tower/mini-tower standard size; and 2) notebook (laptop) streamlined standard size, which are removable by nature.

As with DVD discs, modern DVD players are able to burn data and rewrite it (erase, move, cut copy) to a disc at high speeds and have a Bluray version as well, capable of burning Bluray discs.

DVD drives can and do break through wear and tear; and as a result may need replacing or simply just cleaning the lense - which it uses to read and write data to a disc (just like reading glasses require cleaning).

Most computer repair retailers or wholesalers sell lense cleaning kits which include cleaning fluid and a cloth. If cleaning fails, DVD Slot modules (an actual DVD slot drive unit) can be replaced, by purchasing a new (recommended) or second-hand drive from a computer retailer or wholesaler.

15.4.3. Memory

DDR RAM memory chips do break or need reseating through dislodgement or dust and particle buildup, caused by static or poor computer ventilation. Reseating is the process of removing the RAM memory chip and then putting it back in. ****[CAUTION]: BEFORE ATTEMPTING TO***

REMOVE A DDR RAM MEMORY CHIP, YOU MUST BE SITTING OR STANDING STILL AND HAVE TOUCHED WITH YOUR SKIN, AN EARTHED METAL OBJECT, TO RELEASE STATIC ELECTRICITY FROM YOUR BODY, WHICH CAN 'ZAP' THE CHIP AND DESTROY IT. AFTER 'EARTHING' YOURSELF OR RELEASING THE STATIC ELECTRICITY FROM YOUR BODY, THEN YOU CAN CAREFULLY REMOVE THE CHIPS FROM THE MAINBOARD BY UNCLIPPING (UNLOCKING) THE CHIP USING THE PLASTIC PRESSURE LOCKS PROVIDED ON THE MAINBOARDS FOR DDR RAM MEMORY CHIPS (PRESS DOWN TO RELEASE THE LOCK, USING YOUR THUMB AND MOVE THE LOCK SIDEWAYS), CLEAN THE MAINBOARD MEMORY SLOT BY BLOWING AIR INTO THE SLOT/SOCKET AS WELL AS THE CHIP ITSELF AND THEN GENTLY AND CAREFULLY RESEAT THE CHIP(S) ONTO THE MAINBOARD, BY LOCKING THEM INTO PLACE WITH THE PLASTIC LOCKS ON THE MAINBOARD PROVIDED (PRESS THE LOCK DOWN WITH YOUR THUMB AGAIN, MOVE THE LOCK SIDEWAYS AND THEN ALIGN IT WITH THE CHIP, SO THAT IT LOCKS THE CHIP DOWN INTO PLACE.

If after cleaning the mainboard, slots and chips, there is still a memory error, you should purchase new memory chip modules and discard the old one(s).

15.4.4. Cards and Slots

As with DDR RAM memory chips and slots, the same rules above apply for the trouble-shooting (fault-finding) or diagnosis to find out what the problem is with the card, slot or chip, inserted into your computer or notebook. If after cleaning and reinserting these module devices, there is still a problem, ***check for loose or damaged wires*** which connect to the back (rear) of the device.

U-TECH 2023

16. Data, Restore, Recovery and Backup

Controlling and managing data takes manual effort and time. Making regular or real-time backups may be essential to save your data correctly.

Losing data is a negative experience and recovering data is not much more enjoyable. So take good advice and take a helpful hint to **make copies**!

At times, making backups can get messy if you are not organised, particularly when dealing with large volumes of data.

If you are in the situation where your computer, tablet or smartphone will not start up correctly, staying focused on taking the correct recovery steps in a systematic order to find and get back your documents and photos could be crucial to getting your stuff back.
Notebook computers usually fall into 3 categories of system restore or recovery:

1. No built-in system restore or recovery availability unless you buy the Operating System Disk or download, such as Microsoft Windows or Apple Macintosh OS and install it from a DVD disc or purchased Digital download in the form of an installer.

2. For a long time, many notebooks have contained 1 (one) HD or SSD partitioned (split into two or more sections), which is usually the main drive where the OS and data are installed, split into virtual partition drives, labelled as C Drive and D Drive, whereby the second drive (2nd drive), D Drive is where the System Recovery Image is stored or is used for storage space by the user.
   To activate or launch System Recovery, press the Function Key(s) or other keys and follow the offline (hard copy printed in the computer manual) or online instructions for your Brand and Model of notebook computer, supplied by the manufacturer. For example, if you own a HP notebook, you can search www.hp.com to search for your model of notebook and use a keyword search for 'system recovery' or 'system restore' on their website.

3. Some modern notebooks, such as Lenovo notebook computers (www.lenovo.com), have a System Reset button inside a small pinhole. On older models, it is located under the laptop (at the base), with the text written next to it, '*Reset*.' On newer models, the reset button and hole is next to the Power button on top of the notebook.
   Turn off the notebook with the power plug still connected and electricity flowing to the computer. Insert a paperclip, pin or other thin object, then Menu Options will appear. Select 'Troubleshoot,' then 'Reset This PC.'
   If that does not work, select 'Advanced Options,' then select '***Reset This PC***.'

   ****[CAUTION]: REMEMBER, THAT THIS WILL ERASE ALL OF YOUR FILES (DOCUMENTS, PICTURES, MUSIC AND VIDEOS), SO BEFORE DOING SO, YOU SHOULD CONSIDER BACKING UP YOUR FOLDERS AND FILES TO A SPARE DRIVE OR DISC. IF YOU DO NOT KNOW HOW TO DO THIS, TAKE IT TO A COMPUTER REPAIR SHOP AND THEY CAN DO IT THERE FOR YOU, BEFORE USING THE SYSTEM RESET BUTTON, TO MAKE SURE YOU HAVE ALL OF YOUR DATA.***

UTECH 2023

16.1. Data

Data is something everyone uses in a digital environment. We create it, move it, copy it, paste it, delete it, erase it, remove it and basically move it around all day and night. Every time we are on a computer or technology device and using it, we are working with data.

16.2. Restore

System restore's are a common task that owners should know how to use - particularly Microsoft Windows, which is prone to malware attacks more than other software such as Apple's iOS, Android and probably the safest are Linux OS's.

Making a snapshot or disk image is a smart idea, to keep a carbon copy of your machine and be able to restore it from a .iso file format and continue working. Sure there may be some data loss, but if you backed your data up often, you should be okay, with only a few documents that were not updated.

Typically, System Restore's restore your computer from an earlier backup time.

16.3. Recovery

System recoveries are usually a complete reset for the whole drive – that is, the hard drive (HDD or SSD) are formatted and a system image (.iso file) written to the selected HDD or SSD.

16.4. Backup

A backup is usually a daily or weekly task involving copying (or backing up) your documents, pictures, music and videos to a local storage device/location or network (such as a server or *in the cloud* [cloud computing]) and make copies that can be recovered in case of local data loss.

You can manually do a backup by: selecting the file or folder to copy, then move to the destination where you want to replace the other file or folder, right-click the mouse, touchpad or screen and then select 'replace or *replace all*.' Replace, will only replace one (1) file or folder, whereas the replace all function will replace everything.

17. Power Supplies, Electrical, Electronic, UPS's, Chargers and Charging

17.1. Smartphones

U-TECH 2023

Knowing some electrical and electronic terms may help expand and improve your ability to repair an electronic device and/or electrical component(s) inside your device. Using the correct terminology for a suspect or replacement part may warrant you capable of communicating correctly and efficiently with technology sales staff – a handy skill to have in this pro-technology era that we have built around us over the past 30 years. In 2023 today, smartphones are all the rage (fashionable and popular), becoming more popular than desktop computers. People now rely on their smartphones for daily living, such as: an alarm clock, the news, to check and send emails, receive messages (SMS or app), GPS … and the list goes on.

Rechargeable batteries are now popular for most electronic devices, commonly known as handheld, mobile or portable. These devices operate on low voltage power, usually under 5 Volts (V) DC (Direct Current) via USB charging through the mains plug AC/DC converter.

17.2. iPads

iPads use 4.97 volts (V) and 2.1 amperes or amps (A) of power.

17.3. Android Tablets

Android tablets use 5 volts, 2.1 amps and 10.5 watts of power.

17.4. Notebooks

Notebooks (generally speaking) use a 220-250 Volt AC (Alternating Current) input from standard home wall socket power supplies, which are converted to 19 volts DC (Direct Current) into the notebook, which is then again converted down to 5 volts for usage across the mainboard.

17.5. Desktop and Server Computers

Most desktop and server computers or mounted racks, operate on the standard 220-250 volts D.C. and run on mains power - usually 220-250 Volts AC (Alternating Current) power. Power supplies are fitted inside the computer case housing, usually near the electrical socket. Knowledge of safety and electronic wiring are important, so that you do not get hurt or break your computer.

Many people like to do it themselves, because they are home hobbyists or simply want to save money, however most people on average would employ a computer technician to open, repair or service their computers just like they would hire an electrician or plumber.

18. Free Software: Apps, Programs, OS's and Utilities

U-TECH 2023

Free is a word used in the technology world to usually describe software, apps or programs.

Many people expect something free today. Whether it is a free MS Windows program, a free Android app or a free operating system. People have tried to hack and crack software for decades and have succeeded at it, however there have been and continue to be 'flaws' in this type of activity.

Technically illegal, it is virtually impossible to 'police' and hold any individual legally accountable due to the complications based around privacy and a person's rights to privacy or to just even be held accountable at all, regardless.
Companies, however, are legally challenged from time-to-time over copyright or intellectual property (IP) theft. This is mostly because a lot of money can be involved.

Torrents are pirated (copied), hacked or cracked files such as movies, music and software.

Often these torrent files are either poor quality, will infect your device with malicious ware or will not work (offline or after going online due to trackers within the software that companies use to disable your cracked software).

18.1. Computers

Many companies may want you to try their software by offering you a one (1) month or 30 days free trial and after that time has expired, you must either pay for it or uninstall it (remove it). Some apps are genuinely free, but most 'free' apps are open-source, which means that it has a public license, for anyone to freely use and distribute in its original form (that is, not tampered with before distributing it without permission from the developer, because the software may be subject to terms which include tampering with it and distributing it as a potential or actual new product for sale. The

developers are allowed to demand a fee to use, change or share their software, if they deem you to be making a profit from it in the form of money.

Source Forge has been the most popular open-source website for anyone to download free apps/applications/software/programs for Windows, Mac and Linux. The website address is https://sourceforge.net/

Some companies release free utilities or 'tools,' to download for use of their products, but also - sometimes other products. For example, a disk formatting tool, made by one company, may work on products made by other manufacturers. For example, a formatting utility made by Seagate to format Seagate hard disk drives, may also work with a Toshiba hard disk drive.

Software Types - Internet Name	Meaning
Freeware	Free software
Demoware/Trialware	Time-limited full-featured commercial software (7, 14 or 30 day trial software after which time you must pay for it or uninstall/remove it or it will not work)
Shareware	Freely distributed and functioning software that does not contain all of the features (limited functionality), unless you pay for it
Commercial/Proprietary/Closed-source	Paid software or apps which includes all features with advertising and watermarks removed (unrestricted use, so long as you have paid for the licence for your device – many software developers are strict with licences, in that usually they will only permit 1 licenced copy of their software for use on 1 device
Open-source	Free software that may ask for a donation or be under development. It is free to distribute and use without a commercial licence.

U-TEC 2023

Here are some website links where you can download free (open-source) software programs or apps for your computer or smartphone:

1. The Free Software Directory: https://fsf.org

   Here is the shortcut to the software directory: https://directory.fsf.org/wiki/Main_Page

   Platforms: Windows, MacOS, Linux, iOS, Android

2. Graphics/Picture Editor (Adobe Photoshop Copy): https://gimp.org

   Platforms: Windows, MacOS and Linux

3. Encyclopedia: https://wikipedia.org

4. Office (Microsoft Office copy):

    4.1. https://libreoffice.org (Libre Office)

    Platforms: Windows, MacOS and Linux

    4.2. https://openoffice.org (Open Office)

    Platforms: Windows, MacOS and Linux

18.2. Smartphones

There are sites such as apkpure.com and apkmonk.com which allow you to download and install apps without going through the Google Play store, allowing you to directly download and install software without gaining permission, however your Android system must have the permissions to *allow apps to be installed from unknown sources.* .

The file extension for installing apps on Android are .apk files, which must be given access permission in settings on your phone (*allow apps to be installed from unknown sources*).

If you do a search on the internet, there will be websites out there that offer independently made, as well as commercially available apps for Android - downloadable as a .apk app installer file. This is the native installer file format for Android.

U-TECH 2023

19. Keyboard Shortcuts

Shortcut commands on your keyboard are a quicker and easier way of operating your software, particularly in file management. Cutting, Deleting, Copying or Pasting can all be done a lot faster than using the File Menu, because it is a quick combination of keys 'pressed together' to do certain commands, that are useful in file management and document processing and handling. This allows for a swifter movement of tasks during productivity, whether sending emails or managing data in bulk.

To be able to effectively use keyboard shortcut commands, you first need to be aware of where the shortcut keys are on your keyboard. You can locate the Ctrl (Control Key), the Alt (Alt Key), Shift Key and F Keys (F1-F12) on your keyboard.

To achieve a result from the keyboard shortcuts, you must first highlight or select the text or object that is to be actioned. You do this by using your mouse or touchpad to press and 'hold-down' the left mouse or touchpad button of your device and drag or slide the mouse/touchpad to 'highlight' (which means *select*) the text to do whatever you want with it. This makes tasks a lot quicker.

Keyboard Shortcut Combinations	
Key combination	**Action**
Ctrl+A	Select All
Shift+Ctrl+Home	Go to the top of the page.
Shift+Ctrl+End	Go to the last page.

Ctrl+C	Copy
Ctrl+X	Cut
Ctrl+Z	Undo the last action(s)
Ctrl+V	Paste
Ctrl+P	Print
Shift+Alt	Move an object as you drag it to be where you want it – incrementally (not snapped to a grid point), by using the mouse pointer and left mouse button
Shift+Ctrl+ "+ or -'	Zoom In or zoom Out '+/-'
Esc, Del, F1, F2, F10 or F12	These are the usual F (Function) keys to be pressed at startup, to enter the BIOS on your computer. Be aware, that each manufacturer may use a different key to allow you to enter the BIOS. Search on the internet for which key to use, to enter the BIOS for your device
F7, F8, F9, F10, F11 or F12	Boot (startup) your computer using a different hard drive, OS, DVD, CD, Network Drive or USB device
Scroll Down or Up pages quickly	Fn (Function) key + Up Arrow or Down Arrow
See https://en.wikipedia.org/wiki/Table_of_keyboard_shortcuts for more information.	

U-TECH 2023

20. Technology Dictionary (Glossary)

This dictionary contains words, acronyms and other terms, which will help you understand technology terminology (technical jargon or lingo).

Modern words, acronyms and version numbers such as WPA3, may help solve an important and necessary issue to a particular problem or multiple problems that has or have arisen on the device(s) or network(s).

Technical Dictionary and Vocabulary		
Android=Linux smartphone OS.	Antenna=external wire for receiving transmission signal of audio and/or video.	Audio=sound.
Auxiliary=external device.	Bit=1's or 0's (1=true, 0=false) A one or a zero is a bit.	BIOS=Basic Input/Output System
Byte=8 x bits.	CSS=Cascading Style Sheets	

	Chip=microchip or microprocessor chip.	Default=original software settings or state from the developer.
Dialogue Box=A pop-up box which contains options or changeable settings within an app.	DDR= Double Data Rate (version 4) Synchronous Dynamic Random Access Memory (SDRAM) for your computer or notebook computer.	Download=a file, folder or data that has been downloaded from the internet or a network from some location
E-commerce=a website or app that sells goods or services online using a payment gateway to collect the money using a credit card or debit card.	Encryption=encoded data	File Extension= the dot (.xxxx) and letters and/or numbers after, the name of the file used to define what file format (file type) a file is. e.g. 'MyMovie.mp4' (dot m p four file format (also called the 'file extension')
Firmware=software for your BIOS hardware: this is the software that operates the functioning and operations of the mainboard and its peripherals such as hard disk drives, USB ports, graphics cards, displays and security	Floppy disk=the first flexible hard disks for floppy disk drives	ftp=file transfer protocol (a download alternative protocol to http. It can be secured with a username and password. For example: ftp://ftp.website.com/folder_A
ftps=file transfer protocol secure (a secure ftp connection to upload or download files to a remote location online)	Generic=non-specific, general generic drivers for a graphics card e.g. Microsoft Windows generic graphics display drivers and not Nvidia graphics display drivers	Gigabit=1,000,000,000 x bits.
GB=Gigabyte 1 GB=1,000,000,000 bytes.	HTML=hyper text markup language	http=hypertext transfer protocol https=hypertext transfer protocol secure
IP=Internet Protocol	IP address=Internet Protocol address (IPv4 or IPv6)	IR=InfraRed: wireless / remote infrared light connection technology such as a TV remote control

UTECH 2023

Jack=also known as a plug, such as a 3.5 mm audio jack for a computer or smartphone	Kernel=the core computer program of the operating system (OS)	Kilobit=1,000 x bits.
Kbps=Kilobits per second	Kilobyte=1,000 x bytes.	Mbps=Megabits per second
Megabit=1,000,000 x bits.	Megabyte=1,000,000 x bytes.	Mic=microphone
MP3=MPEG III (Audio version 3 file: .mp3)	MP4=MPEG IV (Video version 4 file: .mp4)	OS=Operating System
Ping=to send an IP port open request (test) command to a domain name (website) from a command line, e.g. ping google.com	Plug=also known as a jack, such as a 3.5 mm audio plug	Plug=also known as a jack, such as a 3.5 mm audio plug
POP3=Post Office Protocol version 3 (for receiving emails)	RFC=request for comments: a standards publication written by a group of internet and computer scientists and engineers at the IETF (Internet Engineering Task Force)	RPM=Revolutions per Minute (HDD speed); RPM=Redhat Package Manager file extension (.rpm) for Redhat Linux OS's.
Sandbox=a virtual computing folder or environment used to prevent software viral infections to installed programs or apps	SCSI=Small Computer System Interface	SMTP=Simple Mail Transfer Protocol (for sending emails)
TCP=Transmission Control Protocol	Upload=a file or folder that is uploading or has been uploaded to a remote location, such as a Cloud service or computer server, somewhere.	UPS=uninterrupted power supply: this is like having a battery inside a powerboard, which means that if the mains electricity stops, the UPS sustains power to your device(s), avoiding interruptions and damage
USB=Universal Serial Bus	WAN=Wide Area Network	Web Portal=a secure login for a website, to access information
Webmail: online email account using a web browser	www=world wide web	XHTML=XML HTML web page

U-TECH 2023

XML=extensible markup language (used for transmitting data efficiently in a customised format)		

Thank you for downloading and reading this ebook. Your increased knowledge will support you whenever and wherever you face technology. This book has given you the skills to manage technology easier than you could before. These skills give you the ability to use your knowledge to make the right decisions, when interacting with technology in everyday life.

THE END
<THE FINAL PAGE>

U-TECH 2023